PUBLIC HEALTH REPORTS

VOL. 38 AUGUST 24, 1923 No. 34

THE NOMENCLATURE OF THE MELITENSIS-ABORTUS GROUP OF BACTERIAL ORGANISMS.

By ALICE C. EVANS, Associate Bacteriologist, Hygienic Laboratory, United States Public Health Service.

There is so much confusion in the nomenclature of the *melitensis-abortus* group of bacterial organisms that a brief consideration of the various names that have been applied, together with conclusions as to the generic and specific names which appear to be available and valid in the light of recent investigations, is a necessary preliminary step to the publication of reports of further investigations of this subject.

The first report of the isolation of cultures of the group of organisms under consideration was by Bruce in 1887.[1] He obtained the specific germ, upon autopsy, from the spleens of human cases which had died of undulant fever on the island of Malta. It was not until 1893, however, when he published a more complete description of his organism, that he named it "*Micrococcus melitensis.*"

Durham (1898) appears to have been the first writer to note that a bacillary form also occurs. He believed that conditions of temperature and medium determined whether the forms would be coccoid or bacillary.

Eyre (1912) mentions the fact that some investigators consider the organism a real "bacillus." He explains the rodlike forms as involution forms, however, or as dividing cocci between which the separation is not yet complete.

The generic name "*Bacillus*" for the Malta fever organism has been used by Jordan in his "Textbook of General Bacteriology" since the third edition, which appeared in 1912. The majority of American textbooks, however, have clung to the name "*Micrococcus melitensis,*" although all investigators who have studied the organism in recent years have agreed that it is a rod form.

Bruce's choice of the generic name "*Micrococcus*" is explainable. In the Hygienic Laboratory collection of 19 strains from human

[1] Bibliographic references are given at the end of this article.

sources there are 3 for which the geographical source is not accurately known, but circumstantial evidence indicates that two of them, possibly all three, were originally obtained on the island of Malta. The history of these strains is as follows:

Strain 102 was obtained in December, 1907, from England. According to the record it was labeled "*M. melitensis*, Dr. Annett." Strain 103 was obtained from the Royal Army Medical Corps of London, England, in January, 1908. It was labeled "*M. melitensis*, R. A. M. C." Colonel Bruce, R. A. M. C., the discoverer of the Malta fever organism, was the chairman of the British Commission for the Investigation of Mediterranean Fever, which made its report of the investigation on the island of Malta during the years 1905–1907. It appears very likely that these two cultures, received from England a few months subsequent to the publication of the final report of the commission, were obtained on the island of Malta. There is no record of the origin of the third strain, No. 104, other than that it was obtained from the United States Naval Medical School in 1909. The fact that the strain is identical with strains 102 and 103, according to every test that has been applied, suggests that possibly this strain, also, may have been collected in Malta.

The three strains under discussion consist almost entirely of coccoid cells. They present quite a different appearance from the remaining strains in which distinct rod forms are evident at a glance, scattered among the coccoid cells. In this connection it should be noted that the illustration accompanying Bruce's description of his organism corresponds with the three strains of predominating coccoid cells. Most of the cells of these strains (102, 103, 104) are, in Bruce's own words, "round or slightly oval," with only an occasional distinctly elongated form. Serologically, also, the three of our coccoid strains belong to a distinct type, as shown by the agglutinin absorption reactions.

It appears most probable that Bruce was working with strains which were of peculiar morphological type, as judged by the morphology of the majority of the 19 strains in our collection. If the morphology of the species were to be judged by these three strains alone, it might still be considered a "*Micrococcus*." There is no question, however, that they belong to the same species as the more common strains in which the bacillary forms are more predominant, for strains of both morphologies are identical in cultural and biochemical reactions, and they can not be differentiated by the simple agglutination reactions.

In 1918 the present author made the observation that there is a very close relationship between the Malta fever organism and the so-called "*Bacillus abortus*" which Bang, in 1897, had established as the cause of contagious abortion in cattle.

The generic name "*Bacillus*," which formerly had been applied promiscuously to all rod forms of bacteria, was no longer in conformity with the nomenclature adopted by the Society of American Bacteriologists, since the Committee of the Society of American Bacteriologists on Characterization and Classification of Bacterial Types, in its 1917 report, restricted the generic name "*Bacillus*" to aerobic spore-bearing rods. The nonspore-bearing pathogenic rod forms were classified in the genus "*Bacterium*." Thus "*Bacillus abortus*" became "*Bacterium abortus*," [1] and the closely related "*Micrococcus melitensis*" became "*Bacterium melitensis*." Following the writer's observations that the causal agent of Malta fever in man and that of contagious abortion in cattle are closely related, and that the so-called "*Bacillus bronchisepticus*"—the cause of distemper in dogs and of a similar disease in other animals—resembles them morphologically, culturally, and biochemically, the Committee suggested (1920) that if these observations were confirmed the mentioned organisms should probably constitute a new genus, because they differed so widely from the type species of the genus *Bacterium*.

That the Malta fever and contagious abortion organisms are closely related was confirmed by Fleischner, Meyer and Shaw in 1919, and later by a number of other investigators. Meyer and Shaw (1920) proposed the generic name "*Brucella*," in the family *Bacteriaceæ*, to include the Malta fever and contagious abortion organisms. That name has met with general approval, and has been used by foreign investigators (Khaled, Archibald).

Meyer and Shaw did not, however, give a generic diagnosis for the genus *Brucella*, and they did not consider other species besides the *melitensis-abortus* group which would logically belong to the new genus. They were apparently unaware that Castellani and Chalmers had already described a newly created genus, "*Alkaligenes*," which, according to its definition, would include the *melitensis-abortus* group. The definition is as follows: "Bacillaceæ growing well on ordinary laboratory media; not forming endospores; aerobes, and often faculative anaerobes; without fluorescence, pigment formation, or gelatin liquefaction; without polar staining; Gram-negative, without a capsule * * *. Milk not clotted; glucose and lactose not fermented." The type species of the genus "*Alkaligenes*" as established by "original designation," is *A. fæcalis*, a common intestinal saprophyte. Castellani and Chalmers left the "*Micrococcus melitensis*" unclassified generically—"*Incertæ sedes*"—because they were doubtful as to whether it should be considered a coccus or a rod form.

[1] In its final report on the families and genera of the bacteria (J. Bact. 1920, *5*: 191-229), the Committee changed the specific name "*abortus*" to "*abortum*," presumably to have the ending agree with *Bacterium*. This was an error, for *abortus* is not an adjective, but a Latin noun in the genitive of the third declension. Hence its ending is independent of the ending of the generic name.

Bacteriological nomenclature is passing through an experimental, transitional stage, and criteria which should serve for valid specific or generic distinctions have not been established in detail. The characteristics which are available at present for bacterial classification are few; they are more or less variable according to varying conditions; and they are not well correlated. Hence comes the difficulty in classifying bacteria into a system comparable with that of the higher organisms. It appears that, in many cases, distinction must be made by means of the sum total of differences, rather than by differences in particular stable characteristics, such as obtains in the classification of higher organisms.

If *melitensis* is considered cogeneric with *fæcalis*, then the Law of Priority demands the acceptance of the generic name *Alkaligenes*. If, however, the differences between the two species are sufficient for generic distinction, the valid name of the genus is *Brucella*. The writer is of the opinion that a generic distinction should be made between the organisms under discussion, which are characteristically invaders of the tissues of animals, and the type species of *Alkaligenes*, which is characteristically a saprophyte. Morphologically, also, *melitensis* is readily distinguished from *fæcalis* by its smaller size and by its great numbers of coccoid cells.

There is given herewith a general description of *melitensis*, the type species of the genus *Brucella:*

Minute rods with many coccoid cells; (the cells of 2-day cultures grown on the surface of plain agar and stained with carbol fuchsin appear about 0.5 of a micron wide and 0.5 to 2 microns long); not forming endospores; nonmotile; aerobic, or preferring a slightly reduced, partial pressure of oxygen; without gelatin liquefaction; Gram-negative; parasitic, invading animal tissues; neither gas nor acid production from the carbohydrates.

Other species, which vary somewhat from the foregoing description, will logically be allocated to the genus *Brucella*. This genus should include a variety of small rod-forms commonly present in freshly drawn cow's milk. These forms were described in an earlier publication (Evans 1918) as bacteria related to "*Bacterium abortus*." Some of them vary from the typical *Brucella* in the production of a slight amount of acid from the carbohydrates. The genus *Brucella* should also include the species *bronchisepticus*, which varies from the typical *Brucella* in being motile. A number of other species should also probably be classified in the genus *Brucella*.

Meyer and his associates have continued the used of the abbreviation "B." for the generic designation of *melitensis* and *abortus*. Since that is the accepted abbreviation for the genus *Bacillus*, there should be some other for the genus *Brucella*. The abbreviation *Br.* is proposed for that genus.

But the point may be made here that whenever a generic name is referred to in any paper it should be printed in full the first time it is cited in the article.

Every investigator since 1918 who has compared the Malta fever and the contagious abortion organisms has found a close relationship between them. The literature on this subject is reviewed in the following paper. The accumulating evidence of the close relationship between the strains of bovine and human origin has culminated in the conclusion by Burnet, that *melitensis* and *abortus* are not distinct bacteriological species, but merely distinct serological varieties or subspecies of one and the same species. All the literature on the subject leads to this conclusion. Observing priority of publication as determining the nomenclature, we must adopt as the specific name for the *melitensis-abortus* group the name *melitensis*.

The writer has recently collected a considerable amount of serological data which show that strains of human, bovine, porcine, caprine, and equine origin can not be distinguished by the simple agglutination test. By the agglutinin absorption test these strains fall into distinct serological types which may be considered as varieties or subspecies. One, which may be designated as the *Brucella melitensis abortus* variety includes the majority of bovine and porcine strains. The serological types which consist chiefly of strains from human and caprine sources may be designated as variety *melitensis*, i. e., *Brucella melitensis melitensis*, and may be further designated tentatively as A, B, etc.

The varieties *abortus* and *melitensis* A of *Brucella melitensis* are more closely related to each other than are Types I and II *Neisseria intracellularis-meningitidis* (Meningococcus), and they are also more closely related than are Types I and II *Diplococcus pneumoniæ* (Pneumococcus); for in the case of both of these other species the serological types can be differentiated by the simple agglutination test.

Acknowledgment.—The writer is indebted to Dr. C. W. Stiles, of the Hygienic Laboratory, for advice concerning the principles of Linnean nomenclature.

REFERENCES CITED.

Archibald, R. G. (1923): An unusual and fatal case of undulant fever contracted in Khartoum. J. Trop. Med. & Hyg., Lond., *26*, 55–57.

Bang, B. (1897): Die Aetiologie des seuchenhaften ("infectiösen") Verwerfens. Ztschr. f. Thiermed., Jena, *1*, 241–278.

Bruce, David:

(1887)—Note on the discovery of a microorganism in Malta fever. Practioner, Lond., *39*, 161–170.

(1893)—Sur une nouvelle forme de fièvre rencontrée sur les bords de la Méditerrannéenne. Ann. de l'Inst. Pasteur, Par., 7, 289–304.

Burnet, Et. (1923): Rapports du Micrococcus melitensis et du B. abortus de Bang.

Arch. Inst. Pasteur de l'Afrique du Nord, *3*, 48–66.

Castellani, Aldo, and Chalmers, Albert J. (1919): Manual of tropical medicine. 3d ed., 2436 pp. London.

Durham, Herbert E. (1898): Some observations on the Micrococcus melitensis (of Bruce). J. Path. & Bacteriol., *5*, 377–388.

Evans, Alice C. (1918): Further studies on Bacterium abortus and related bacteria. II. A comparison of Bacterium abortus with Bacterium bronchisepticus and with the organism which causes Malta fever. III. Bacterium abortus and related bacteria in cow's milk. J. Infect. Dis., *22*, 580–593; *23*, 354–372.

Eyre, J. W. H. (1912): Mittelmeerfieber. *In* Kolle und Wassermann. Handbuch der pathogenen Mikroorganismen. *2*. Aufl., Bd. *4*, 423, 424.

Fleischner, E. C., Meyer, K. F., and Shaw, E. B. (1919): A résumé of some experimental studies on cutaneous hypersensitiveness. Am. J. Dis. of Children, *18*, 577–590.

Jordan, Edwin O. (1912): A textbook of general bacteriology. 3d ed., 623 pp. Philadelphia and London.

Khaled, Z. (1921): A comparative study of bovine abortion and undulant fever, from the bacteriological point of view. J. Hyg., Cambridge, Eng., *20*, 319–329.

Meyer, K. F., and Shaw, E. B. (1920): A comparison of the morphologic, cultural, and biochemical characteristics of B. abortus and B. melitensis. Studies on the genus Brucella nov. gen. I. J. Infect. Dis., *27*, 173–184.

Royal Society (London) Advisory Committee (1905–1907): Reports of the Commission appointed by the Admiralty, the War Office, and the Civil Government of Malta, for the investigation of Mediterranean fever. Pts. 1–7. London.

Winslow, C.-E. A., Broadhurst, Jean, Buchanan, R. E., Krumwiede, Chas., jr., Rogers, L. A., and Smith, George H.:

(1917)—The families and genera of the bacteria. Preliminary report of the Committee of the Society of American Bacteriologists on Characterization and Classification of Bacterial Types. J. Bacteriol., *2*, 505–566.

(1920)—The families and genera of the bacteria. Final report of * * *. Ibid., *5*, 191–229.

THE SEROLOGICAL CLASSIFICATION OF BRUCELLA MELITENSIS FROM HUMAN, BOVINE, CAPRINE, PORCINE, AND EQUINE SOURCES.

By ALICE C. EVANS, Associate Bacteriologist, Hygienic Laboratory, United States Public Health Service.

REVIEW OF THE LITERATURE.

The observation that the causative organism of Malta fever and that of contagious abortion in cattle are closely related in their morphological, cultural, biochemical, serological, and pathogenic characteristics (Evans, 1918) was confirmed by Meyer and his associates in this country, by Zeller, Jaffé and Skarić in Europe, by Khaled in Egypt, and by Burnet in Tunisia. Fleischner, Meyer, and Shaw found, further, that the test for cutaneous hypersensitiveness, which they regard as highly specific, can not differentiate between experimental infections in guinea pigs, caused by *Brucella melitensis* varieties *abortus* and *melitensis*.[1] Burnet subjected four

[1] See the preceding paper (pp. 1943–1948 of this issue) for a discussion of the nomenclature of this bacterial species.

Malta fever patients to the intradermal test with three *Br. melitensis* antigens, one prepared with the *melitensis* variety and two with the *abortus* variety—a bovine and a porcine strain, respectively. The three reactions were positive at the same time in all four cases, and in all four cases the porcine strain provoked the strongest reaction.

Fleischner, Vecki, Shaw, and Meyer compared the pathogenicity for monkeys of strains of *Br. melitensis* from human and from bovine sources. By feeding large doses of virulent strains of the *abortus* variety they were able to infect monkeys as demonstrated by isolation of the organism from the viscera and heart blood at necropsy. *Br. melitensis melitensis* was far more invasive, however, causing infection in comparatively small doses.

Meyer and his associates also studied the pathogenicity of the *abortus* and *melitensis* varieties of *Br. melitensis* for guinea pigs. They found the *abortus* variety slightly more invasive and virulent, as a rule, than the *melitensis* variety. The gross anatomic and the histologic changes were so nearly alike for the two infections, however, that they could sometimes be differentiated only by careful serologic cross absorption tests with the isolated organisms. Jaffé also found that the inflammatory changes in the case of *Br. melitensis* varieties *abortus* and *melitensis* infections in guinea pigs were qualitatively alike, with more pronounced changes in the case of the *abortus* infections. Burnet also states that he is of the impression that the *abortus* variety is more virulent than the *melitensis* variety for guinea pigs. On the contrary, Khaled found the *melitensis* variety much more virulent than the *abortus* variety for guinea pigs.

Huddleson found that the tissue changes produced in guinea pigs by virulent strains of the *melitensis* variety could not be distinguished from those changes produced by virulent strains of the *abortus* variety. Certain strains of both varieties failed, however, to produce the characteristic lesions in guinea pigs. The author attributes the lack of virulence to long cultivation in an artificial medium. It is well recognized that pathogenic bacteria lose their virulence when grown on artificial media, and this loss in virulence has been commonly noted in the organism of contagious abortion. Hence a fair comparison of the virulence of the varieties of *Br. melitensis* can not be made with strains whose histories differ greatly.

Khaled immunized a monkey by treating with the *abortus* variety and found a mild reaction to an infecting dose of the *melitensis* variety as compared with an untreated control monkey. This was the only record of a cross immunization experiment found in the literature.

Feusier and Meyer made a study of the agglutinin absorption reactions of 1 bovine and 11 human strains of *Br. melitensis* and 2 strains of *paramelitensis*. The strains fell into groups as follows:

Group 1: One human strain of *Br. melitensis*, and the one bovine strain.

Group 2: Nine human strains of *Br. melitensis*.

Group 3: One human strain of *Br. melitensis*.

Group 4: Two strains of *Br. paramelitensis*.

Groups 1 and 2 were so closely related that they could not be differentiated by simple agglutination tests, although certain differences were manifest in agglutinin absorption tests. Thirty-two strains isolated from aborted fetuses or pathologic discharges or milk of cattle and hogs in this country or in England all fell into group 1, according to the tests that were made. The authors state, however, that the complete absorption technique was carried out with only one strain of the *abortus* variety.

A review of the literature, therefore, leaves no question about the close relationship between strains of *Br. melitensis* from bovine and human sources.

SCOPE OF THIS STUDY.

The epidemic of Malta fever which occurred in Arizona in 1922, (reported by Lake) and a few sporadic cases which have come to our attention have renewed an interest in the causal organism of this disease. It appeared important that a larger series of human strains than that of Feusier and Meyer should be serologically classified and compared with caprine strains and with the organism causing contagious abortion in cattle and other species of domestic animals.

Accordingly, a collection of strains has been made. The sources of the strains and the date of isolation, as far as the information could be obtained, are recorded in tabular form (Table I). The writer is indebted to the many investigators whose names appear in the table for generous response when requests for cultures were made. Altogether 49 strains have been received and serologically classified.

TABLE I.—*History of the strains.*

STRAINS FROM HUMAN SOURCES.

Number of strain.	Pathological source.	Date of isolation.	Place of isolation.	From whom obtained.
102	(?).....	(?).....	(?).....	Hygienic Laboratory collection. Obtained from England in 1907. Labeled "M. melitensis," Dr. Annett.
103	(?).....	(?).....	(?).....	Hygienic Laboratory collection. Obtained from Royal Army Medical Corps, London, England, in 1908.

TABLE I.—*History of the strains*—Continued.

STRAINS FROM HUMAN SOURCES—continued.

Number of strain.	Pathological source.	Date of isolation.	Place of isolation.	From whom obtained.
104	(?)	(?)	(?)	Hygienic Laboratory Collection. Obtained from U. S. Naval Medical School in 1909.
426	(?)	(?)	Austria (?)	Dr. K. F. Meyer. Originally from Royal Army Medical Corps, London, England.
427	(?)	(?)	Sicily (?)	Dr. K. F. Meyer. Obtained from Dr. Guido Tsar, Catania, Sicily.
428	(?)	(?)	Tunisia (?)	Dr. K. F. Meyer. Obtained from Dr. E. Sergent, Institut Pasteur d'Algerie, Tunis.
451	Blood	September, 1922	Phoenix, Ariz.	Dr. G. C. Lake.
455	Blood	November, 1922	Baltimore, Md.	Dr. H. L. Amoss, Johns Hopkins University Hospital, Baltimore, Md.
461	(?)	(?)	(?)	Army Medical School, Washington, D. C. Obtained from New York City.
462	(?)	1911	Texas	Army Medical School, Washington, D. C.
463	(?)	(?)	(?)	Army Medical School, Washington, D.C. Obtained from Parke, Davis and Co., Detroit, Mich. Originally from Kral's collection.
464	Blood	1896	London, Eng.	Society of American Bacteriologists' collection. Labeled "Micrococcus melitensis 33."
489	(?)	(?)	(?)	H. K. Mulford Co. Culture No. 545. Obtained from Kral's Museum in 1913.
505	(?)	(?)	Italy (?)	Dr. C. Gorini, Laboratorio di Batteriologia, Scuola Superiore Agricoltura di Milano.
506	Blood	May (?), 1923	New York City	Dr. L. W. Famulener, St. Luke's Hospital, New York City. Infection was contracted in Phoenix, Ariz.

STRAINS FROM BOVINE SOURCES.

456	Cow's fetus	September, 1917	Laurel, Md.	Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C.
457	(?)	Prior to December, 1918.	(?)	Dr. B. A. Beach, College of Agriculture, Madison, Wis. Labeled "Wis. W."
458	(?)	Prior to December, 1918.	(?)	Dr. B. A. Beach, College of Agriculture, Madison, Wis. Labeled "Wis. M."
459	Cow's fetus	January, 1917	Gambrills, Md.	Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C.
460	(?)	January, 1920	Michigan (?)	Dr. I. F. Huddleson, Michigan Agricultural College, East Lansing, Mich., "No. 200."
465	Stomach of aborted fetus.	December, 1922	Minnesota (?)	Dr. C. P. Fitch, University of Minnesota.
466	Colon of aborted fetus.	January, 1923	New York State (?).	Dr. W. A. Hagan, Cornell University, Ithaca, N. Y.
467	Duodenal contents of prematurely born calf.	1919	Connecticut (?)	Dr. Leo F. Rettger, Yale University, New Haven, Conn. Labeled "St. 4."
468	Duodenal contents of prematurely born calf.	1920	Connecticut (?)	Dr. Leo F. Rettger, Yale University, New Haven, Conn. Labeled "St. 6."
474	Aborted calf	February, 1922	Gilbert, Iowa	Dr. S. H. McNutt, Iowa State College, Ames, Iowa. Labeled "Crawford."
476	Aborted fetus	December, 1917	Beltsville, Md.	Bureau of Animal Industry, U. S. Department of Agriculture.
477	Uterine exudate	(?)	Province Zuid, Holland.	State Serum Institute, Rotterdam, Holland.
478	Aborted calf	(?)	Province Zeeland, Holland.	Do.
479	Aborted calf	(?)	Province Gelderland, Holland.	Do.
480	(?)	(?)	(?)	Prof. K. Suffle, Universität München, Germany.

TABLE I.—*History of the strains*—Continued.

STRAINS FROM BOVINE SOURCES—continued.

Number of strain.	Pathological source.	Date of isolation.	Place of isolation.	From whom obtained.
485	(?)	(?)	Zurich, Switzerland.	Dr. G. Sobernheim, Institute zur Erforschung der Infektionskrankheiten, Berne, Switzerland.
497	(?)	Prior to April, 1916.	(?)	Dr. Edgar B. Carter, Swan-Myers Co., Indianapolis, Ind. Labeled "B. abortus 101.1."
498	(?)	Prior to April, 1916.	(?)	Dr. Edgar B. Carter, Swan-Myers Co., Indianapolis, Ind. Labeled "B. abortus 101.2."
499	Placenta	January, 1918	Logansport, Ind.	Dr. Edgar B. Carter, Swan-Myers Co., Indianapolis, Ind. Labeled "B. abortus 101.3."
500	(?)	Prior to May, 1920.	(?)	Dr. Edgar B. Carter, Swan-Myers Co., Indianapolis, Ind. Labeled "B. abortus 101.4."
501	(?)	do	(?)	Dr. Edgar B. Carter, Swan-Myers Co., Indianapolis, Ind. Labeled "B. abortus 101.5."
502	(?)	do	(?)	Dr. Edgar B. Carter, Swan-Myers Co., Indianapolis, Ind. Labeled "B. abortus 101.6."
503	(?)	do	(?)	Dr. Edgar B. Carter, Swan-Myers Co., Indianapolis, Ind. Labeled "B. abortus 101.7."

STRAIN FROM CAPRINE SOURCE.

504	(?)	(?)	Italy (?)	Dr. C. Gorini, Laboratorio di Batteriologia, Scuola Superiore Agricoltura di Milano, Italy.

STRAINS FROM PORCINE SOURCES.

472	(?)	Prior to May, 1921.	(?)	Dr. Robert Graham, College of Agriculture, Urbana, Ill. Labeled "2012."
475	(?)	1923	Iowa City, Iowa.	Dr. S. H. McNutt, Iowa State College, Ames, Ia. Labeled "Crow."
481	Liver of aborted pig.	June, 1920	Missouri	Dr. G. W. Connaway, University of Missouri, Columbia, Mo. Labeled "Hulen."
482	Colostrum from sow.	July, 1920	do	Dr. G. W. Connaway, University of Missouri, Columbia, Mo. Labeled "A. H. 15 No. 123."
483	Liver of aborted pig.	February, 1922	do	Dr. G. W. Connaway, University of Missouri, Columbia, Mo. Labeled "Jac."
484	Colostrum from sow.	May, 1922	do	Dr. G. W. Connaway, University of Missouri, Columbia, Mo. Labeled "M. 18."
494	(?)	1920	California (?)	Dr. Jacob Traum. Labeled "Strain 1."
495	(?)	do	do	Dr. Jacob Traum. Labeled "Strain 1A."
496	(?)	1921 (?)	do	Dr. Jacob Traum. Labeled "Strain HFIV."

STRAIN FROM EQUINE SOURCE.

473	Aborted foal	April, 1922	Clear Lake, Iowa.	Dr. S. H. McNutt, Iowa State College, Ames, Iowa.

TECHNIQUE.

As the work progressed, new information was obtained which revealed advantages to be gained by changes in method. Such changes were made. The following description applies to the methods found to be most efficient and practicable.

Preparation of antigen.—Cultures for the preparation of antigen were grown on agar in Blake bottles. The addition of 1 per cent glucose greatly enhanced the vigor of growth. The best growth, however, was obtained on agar, of a hydrogen ion concentration of pH about 6.8, prepared with liver in place of the meat of ordinary infusion agar. The cultures were incubated at 37° C. for two days. The growth from each bottle was washed from agar in about 40 c. c. of normal saline solution. In the latter part of the work here reported the suspension was then heated to 60° C. for 30 minutes. The absorbing capacity of the antigen was slightly injured by the heat. The common experience in this and other laboratories, however, in finding *Brucella melitensis* peculiarly infectious to laboratory workers, made it inadvisable to handle large quantities of living antigen. The suspensions were centrifugalized, the supernatant fluid was removed, the sediment was taken up in normal saline solution, and the density was adjusted to 20,000 parts per million of the silica standard of the American Public Health Association. This antigen kept without deterioration for weeks in an ice box at about 4° C. For the simple agglutination test, the stock antigen was diluted to 1,000 p. p. m. with buffered saline solution (described by the writer in an earlier publication) of a hydrogen ion concentration of pH 7.0. An antigen of double, triple, or quadruple density, for absorption tests, was prepared from the 20,000 p. p. m. antigen by centrifugalizing and removing enough of the clear supernatant fluid to obtain the desired density.

Preparation of serums.—Rabbits were used for the preparation of serums. A titer of 1:640 was found to be the most convenient for the absorption tests. Intravenous injection with 2 c. c. of a living antigen of a density of 2,000 p. p. m. sometimes produced a serum of the desired titer after 7 days.[1] More frequently it produced an antigen of too high titer. In that case another serum of low titer was produced by inoculating a rabbit with 2 c. c, of living antigen of a density of 1,000 p. p. m. and drawing the blood on the fourth day. The two serums were then pooled in the proper proportion to give a titer of 1:640. The serums were designated by the number of the strain used for their preparation.

Absorption of agglutinin tests.—It was found that a living antigen of a density of 60,000 p. p. m. will absorb all agglutinins from its homologous rabbit serum of a titer of 1:640 when the absorption is carried out in a 1:5 dilution of the serum. (After the addition of the serum the actual density of the antigen is 48,000 p. p. m.) If a heat-killed antigen is used, the absorption is not always complete under those conditions. It is therefore necessary to compare the

[1] It has been found that after intravenous inoculation with a heavy dose of living *Br. melitensis* a rabbit is a dangerous disseminator of infection. In further work that is contemplated a trial will be made of killed culture for agglutinogen.

absorbing capacity of an unknown strain with the absorbing capacity of the homologous strain with identical treatment in the preparation of the antigens and with identical absorption technique.

The protocol for a typical absorption experiment is given in Table II. In the case of each test, 6 c. c. of antigen of a density of 20,000 p. p. m. were placed in a centrifuge tube, the antigen was thrown down by centrifugation, and 4 c. c. of the supernatant fluid were removed. The sediment was emulsified in the remaining fluid, and 0.5 c. c. of serum was added. The tubes were incubated in a water bath at 37° C. for 4 hours, then removed to a cold room to be kept until the following day, when the antigen was again thrown down by centrifugation, and the simple agglutination test was carried out on the serums thus diluted and absorbed.

TABLE II.—*Absorptions of agglutinins from serum 426.*

Treatment of serum.	Serum diluted 1 to —							
	10	20	40	80	160	320	640	1280
Control, not absorbed			4	4	4	4	3	0
Absorbed by 426	1	0	0					
Absorbed by 427	3	4	3	1	0			
Absorbed by 466	0	0	0	0	0			
Absorbed by 480	4	4	4	4	1	0		
Absorbed by 489	4	4	4	4	3	0		

The simple agglutination test was with the homologous antigen.

4, complete sedimentation; 3, supernatant turbidity as in a control tube containing 25 per cent as much antigen as in the tubes in which the test was carried out; 2, supernatant turbidity as in a control tube containing 50 per cent of the antigen; 1, supernatant turbidity as in a control tube containing 75 per cent of the antigen.

The table shows that the type of strain 466 is identical with that of strain 426, whereas strains 427, 480, and 489 belong to other serological types.

Simple agglutination test.—Serum dilutions were made with the buffered saline solution (pH 7.0). One-half c. c. of diluted serum and an equal quantity of antigen of a density of 1,000 p. p. m. were incubated together in a water bath at 37° C. for 4 hours. The racks were then removed to a cold room of a temperature of about 15° C., where they stood overnight, and readings were made on the following day. A reaction was considered positive only when sedimentation of 75 per cent or more of the antigen occurred.

SEROLOGICAL CLASSIFICATION OF STRAINS.

The classification of the strains was made according to the following principles:

1. Any strain which absorbs agglutinin from the test serum to the same degree as the homologous strain belongs to the same serological group. A strain which absorbs agglutinin from the test serum to a degree slightly different from the homologous strain may or may not belong to the same serological group; but a marked difference in absorbing capacity indicates a difference in serological grouping.

Equal absorbing capacities of two strains from a heterologous serum does not signify that the two strains belong to the same group.

2. Every strain belonging to the same group as the strain used in the preparation of a given serum will completely absorb the agglutinin from the 1:5 dilution of that serum as used in these tests if an absorbing antigen of sufficient density is used; and, vice versa, every strain belonging to another serological group will fail to completely absorb the agglutinin from a given serum under the same conditions.

Through the kindness of Dr. K. F. Meyer in sending strains representing Feusier and Meyer's groups 1, 2, and 3, it was possible to correlate this study with theirs and to use their strains for the starting point in making this classification. (Strain 426 represents their group 1; strain 427 represents their group 2; and strain 428 represents their group 3.) Certain strains were found to differ from Feusier and Meyer's type strains in their absorbing capacities. Whenever a strain was found which failed to correspond with the serological types already established, a serum was prepared with the new type strain and the relationship between it and the other type strains was determined by agglutinin absorption. Altogether seven groups have been found. Some of the small groups are so closely related to the large groups, however, that they should be considered as subtypes. The distribution of the strains in the various groups, together with the animal species from which they were isolated, is given in Table III. The strains with which the serums were prepared for the classification are in heavy type at the head of the columns.

TABLE III.—*The seven serological groups into which the strains fall.*

481 porcine.	**480** bovine.	**426** human. 455 human. 456 bovine. 458 bovine. 460 bovine. 465 bovine. 466 bovine. 467 bovine. 468 bovine. 472 porcine. 474 bovine. 475 porcine. 476 bovine. 477 bovine. 478 bovine. 479 bovine. 482 porcine. 483 porcine. 484 porcine. 485 bovine. 494 porcine. 495 porcine. 496 porcine. 497 bovine. 498 bovine. 499 bovine. 500 bovine. 501 bovine. 502 bovine. 503 bovine.	**457** bovine.	**427** human. 463 human.	**451** human. 428 human. 459 bovine. 461 human. 462 human. 464 human. 473 equine. 489 human. 504 caprine. 505 human. 506 human.	**101** human. 102 human. 103 human.

The relationships between the various groups as shown by agglutinin absorption tests are given in Table IV. The same strains used for the preparation of the serums were used for absorbing antigens, except in one case. Strain 428, which was found to be identical with strain 451 in its absorbing capacity, was substituted for strain 451 in the absorption tests, because the latter, having been recently isolated from a human case, was considered more dangerous to handle in large quantities than strains which had been grown for a long time on agar. In every one of the absorption tests summarized in Table IV a serum of a titer of 1:640 was absorbed with an antigen of a density of 60,000 p. p. m. (48,000 p. p. m. after the addition of the serum) in a 1:5 dilution of the serum. Most of the absorption tests recorded in Table IV were carried out with a living antigen. Whenever a heated antigen was used, it is indicated in the table. All the absorptions from serum 480 were made with heated antigens. The protocol shows, however, that absorption by the homologous heated antigen was complete.

TABLE IV.—*The relationship between the strains representing the various serological groups, as shown by the agglutinin absorption reactions.*

	Serum 480, diluted 1 to—								Serum 426, diluted 1 to—								Serum 457, diluted 1 to—							
	10	20	40	80	160	320	640	1280	10	20	40	80	160	320	640	1280	10	20	40	80	160	320	640	1280
Not absorbed	[a]4	4	4	4	4	4	3	0	4	4	4	4	4	4	3	0	4	4	4	4	4	4	3	0
Absorbed by 481	[b]3	2	0	0	0	0	0	....	4	4	4	4	4	2	0	....	[b]4	4	4	4	4	3	1	0
Absorbed by 480	[b]0	0	0	0	0	0	0	....	4	4	4	4	1	0	....	....	4	3	1	0	0	0	0	....
Absorbed by 426	[b]3	3	3	3	2	0	0	....	1	0	0	....	....	....	....	....	0	0	0	0	0	0	....	....
Absorbed by 457	[b]1	0	0	0	0	0	0	....	3	4	2	0	0	0	....	....	0	0	0	0	0	0	....	....
Absorbed by 427	[b]0	0	0	0	0	0	0	....	3	3	2	0	0	0	....	....	0	0	0	0	0	0	....	....
Absorbed by 428	[b]3	4	4	4	4	2	0	....	3	4	4	4	2	0	....	....	[b]3	4	4	4	3	0	....	....
Absorbed by 104	[b]2	3	3	3	0	0	0	....	4	4	4	4	4	4	2	....	3	3	4	4	3	1	0	....

	Serum 427, diluted 1 to—								Serum 451, diluted 1 to—								Serum 104, diluted 1 to—							
	10	20	40	80	160	320	640	1280	10	20	40	80	160	320	640	1280	10	20	40	80	160	320	640	1280
Not absorbed	4	4	4	4	4	4	3	0	4	4	4	4	4	4	3	....	4	4	4	4	4	4	3	1
Absorbed by 481	[b]4	4	4	4	4	3	0	....	4	4	4	4	4	4	3	....	4	4	4	4	4	3	1	....
Absorbed by 480	[b]4	4	4	3	1	0	0	....	4	4	4	4	4	1	....	....	[b]4	4	4	4	2	0	....	....
Absorbed by 426	3	2	1	0	0	0	....	....	4	4	4	4	1	0	....	....	4	4	4	4	3	1	....	....
Absorbed by 457	3	2	1	0	0	0	....	....	4	4	4	4	3	1	....	....	4	4	4	3	1	0	....	....
Absorbed by 427	0	0	0	0	0	0	....	....	4	4	4	2	0	0	....	....	4	4	3	2	1	0	....	....
Absorbed by 428	4	4	4	4	4	2	0	....	0	0	0	0	0	0	....	....	4	4	3	2	1	0	....	....
Absorbed by 104	4	4	4	4	4	3	1	....	2	3	4	4	2	0	....	....	0	0	0	0	0	0	....	....

[a] See footnote to Table II for significance of the figures.
[b] Absorption was with a heat-killed antigen.

The absorptions were therefore made with antigens of a density sufficient to absorb the agglutinins completely from the homologous serums in the dilution used. Furthermore, each heterologous absorbing antigen was of a density sufficient to remove from this dilution of the serums all the agglutinins which that particular antigen could remove under the conditions of the experiment. In

Table V a protocol is given which demonstrates that a living antigen of 40,000 p. p. m. (32,000 p. p. m. after the addition of the serum) was sufficient for the desired purpose, for no more agglutinins were absorbed in any case when the density of the antigen was raised to 60,000 p. p. m. Antigen of a density of 60,000 p. p. m. was chosen for these experiments, however, in order that there might be no question that the absorption had been complete.

TABLE V.—*Protocol showing that an antigen of 40,000 p. p. m. absorbed agglutinins from serum 104 as completely as possible for the given antigen.*

Treatment of serum.	Density.	Serum dilution 1 to—							
		10	20	40	80	160	320	640	1,280
	P. p. m.								
Not absorbed		[a]4	4	4	4	4	4	3	1
Absorbed by 104	40,000	1	0	0	0	0	0	.....	.....
Absorbed by 426	40,000	4	4	4	4	2	1	.....	.....
Absorbed by 426	60,000	4	4	4	4	3	1	.....	.....
Absorbed by 427	40,000	4	4	4	3	1	0	.....	.....
Absorbed by 427	60,000	4	4	3	2	1	0	.....	.....
Absorbed by 428	40,000	4	4	3	2	1	0	.....	.....
Absorbed by 428	60,000	4	4	3	2	1	0	.....	.....
Absorbed by 468	40,000	4	4	4	4	3	1	.....	.....
Absorbed by 468	60,000	4	4	4	4	3	1	.....	.....

[a] See footnote to Table II for the significance of the figures.

A graphic presentation of the relationship between the several serological groups is given in Chart 1. The length of the columns, calculated from the data in Table IV, represents the percentage of agglutinin for the homologous antigen remaining after absorption with an excess of the antigens representative of the several serological groups.

It may be noted that the serological groups represented by strains 426, 457, and 427 are very closely related, as judged by their absorption of agglutinins from serums 426 and 427; and no differences can be observed between these three strains when their absorption of agglutinins from serum 457 is considered. Table III shows that strain 426 represents a large group of strains, including a majority of those from bovine and porcine sources, and it also includes two strains of human origin. On the other hand, strains 457 and 427 represent small groups of one and two strains, respectively. They are so closely related to the group represented by strain 426 that they may be considered as subgroups of that large group.

The remaining groups diverge in two directions from the serological group represented by strain 426, with the group represented by strain 481 at one extreme and the group represented by strain 104 at the other extreme.

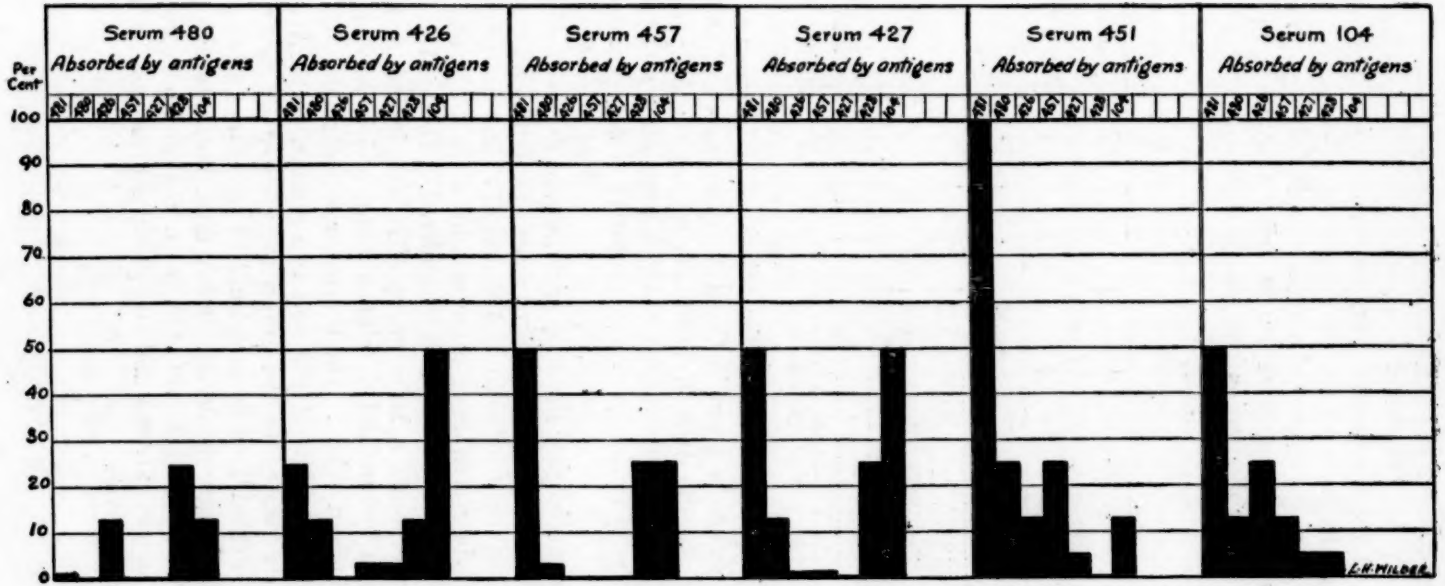

CHART I.—Absorption of agglutinins from the various group serums by strains representing the seven serological groups.

Strain 481 is a peculiar one among the collection of 49 strains. It is the only strain in the collection which agglutinates spontaneously under the conditions of the methods employed in this study for the simple agglutination test. Owing to the spontaneous agglutination of serum 481, the data showing absorption of agglutinins from that serum are omitted. The data obtained by absorbing agglutinins with this strain from the various type serums show that it is rather distantly related to the important types represented by strains 426 and 104, and it absorbed no agglutinins from serum 451. Strain 481 was of porcine origin. It was the only strain belonging to its serological group.

Strain 480 also was the only one found belonging to its serological group. It is a European strain of bovine origin. It forms a connecting link between the serological groups represented by strains 481 and 426.

Strain 451 represents an important group which includes strains of human, caprine, bovine, and equine origins. Three of the four American strains of human origin available for this study belonged to this serological group. It includes strains from four different animal species, isolated in the United States, Europe, and North Africa. Serologically it forms a connecting link between the groups represented by strains 426 and 104.

Strain 104 also represents an important, though a small group. The three strains of this group are of a peculiar morphology, with a majority of coccoid cells and comparatively few elongated forms. Their history is discussed in the preceding paper, in which it is pointed out that it is probable that Bruce was working with strains of this group when he gave the generic name "Micrococcus" to his organism.

TABLE VI.—*Cross agglutinin reactions between the various serological groups of Brucella melitensis.*

Antigen.	Serum 480.	Serum 426.	Serum 457.	Serum 427.	Serum 451.	Serum 104.
480	[a]640	1,280	320	640	640	320
426	640	2,560	640	1,280	1,280	320
457	640	2,560	640	1,280	1,280	320
427	640	1,280	320	640	640	320
451	640	1,280	640	640	1,280	320
104	320	640	640	640	640	640

[a] The figures give the highest dilutions in which a positive reaction (75 per cent or more sedimentation) occurred.

The cross simple agglutinin reactions between the six serological groups of *melitensis* represented by strains 480, 426, 457, 427, 451, and 104 are given in Table VI. In general it may be stated that an unknown strain can not be identified with any one of these six

serological groups by the simple agglutinin test. The cross agglutination between the group represented by strain 104 and the remaining strains was generally lower than agglutination of the various strains in their homologous serums. But this difference in agglutinin response is not enough to differentiate the serological group when the simple agglutinin test is being carried out for diagnostic purposes with an unknown strain, or with an unknown serum.

It is pointed out in the preceding paper that these closely related serological groups belong to a single species, *Brucella melitensis*, and that the serological groups may be designated as varieties. The group represented by strain 426 may be designated variety *abortus;* the group represented by strain 451, may be designated variety *melitensis* A; and the group represented by strain 104 may be designated variety *melitensis* B.

As Table IV and Chart 1 show, the group represented by variety *melitensis* A stands between varieties *abortus* and *melitensis* B in serological relationship. That the simple agglutinin reaction is useless in distinguishing the *abortus* and *melitensis* A varieties has been demonstrated in a practical way a number of times when serums from human cases of *melitensis* infection were tested with antigens of both the homologous and heterologous serological groups. These data are brought together in Table VII. It may be noted from this table that an antigen of the heterologous serological group agglutinated in a higher titer of the serum than the antigen of the homologous group in two of the five cases.

TABLE VII.—*Cross agglutination of human serums in cases of melitensis infection with antigens of the homologous and heterologous serological groups.*

Case.	Titer when tested with strain 426 (variety *abortus*).	Titer when tested with strain 451 (variety *melitensis* A).	Titer when tested with homologous strain.	Serological type of infecting strain.
Br.	[a] 160	320	.....	Corresponds with strain 426.[b]
Balt.	3,200	1,600	1,600	Corresponds with strain 426.
E.	[a] 16	64	.....	Corresponds with strain 451.[b]
St. L.	[a] 160	640	.....	Corresponds with strain 451.
B. S.	5,120	2,560	.....	Do.

[a] Strain 455, belonging to the same serological group as strain 426, was used in these tests.
[b] The infecting strain was not isolated, but its serological grouping was determined by absorption of agglutinins from the serum with the various type antigens.

After the 49 strains included in this study had been classified, a small collection of 9 strains of human and caprine origins was received from Doctor Burnet, of the Pasteur Institute at Tunis. None of the 9 strains was identical with the types already established. Judged by their capacity for absorbing agglutinins from the type serums, they are a heterogeneous lot, including several new serological

types, most of which are more closely related to the group represented by strain 104 (*melitensis* B) than to the other serological groups. They are unlike the *abortus* and *melitensis* varieties in agglutinating in nonspecific serums and they have a greater tendency to spontaneous agglutination in salt solution. Compared with the *melitensis* strains previously studied, the Tunis strains are poor anti-body producers. They agglutinate well in serum 104, many, but not all, of the strains reacting in as high titer as the homologous strain. They agglutinate poorly in serum 426 (*abortus* variety) and serum 451 (*melitensis* A variety).

Previous to 1912 there was a considerable doubt cast upon the specificity of the agglutinin test for *Br. melitensis* infections, because inconsistencies in its application occurred. The discovery by Nègre and Raynaud of a strain which failed to agglutinate, or agglutinated only slightly, in *melitensis* serums explained the inconsistencies and reestablished the test on a firm basis. They designated as *paramelitensis* those strains which were similar to *melitensis* in morphological, cultural, and biochemical behavior, but failed to agglutinate or agglutinated slightly in *melitensis* serum. Absorption of agglutinins by *paramelitensis* from *melitensis* serum was only partial, whereas absorption of the same serum by four *melitensis* strains was complete. Feusier and Meyer found that *paramelitensis* produced lower titers of agglutinins in rabbits than did *melitensis*. Bassett-Smith states that *paramelitensis* is more easily agglutinable in nonspecific serums than is *melitensis*, and that it is more autoagglutinable. The Tunis strains agree in these respects with the descriptions of the *paramelitensis* of Nègre and Raynaud.

DISCUSSION.

It is unfortunate that only one of the 49 strains included in this study was of caprine origin. Presumably in a district where human cases of Malta fever occur, due to consumption of infected goat's milk, the human and caprine strains are of the same serological grouping. The following facts are the only experimental evidence at hand to substantiate that assumption. A human and a caprine strain received from Milan, Italy, both belonged to the variety *melitensis* A. Agglutinin absorption tests with a goat serum of good titer from the Phoenix, Ariz., district indicate that the infecting organism belonged to variety *melitensis* A, as did the human strains 451 and 506, from cases which contracted their infection in that district.

The data presented in this paper confirm the accumulating evidence that the organism causing contagious abortion in cattle and swine belongs to the same species as the organism causing Malta fever in

man. Although one serological group is characteristically of bovine and porcine origin, and another group is characteristically of human (and caprine (?)) origin, it is apparent (Table III) that the serological groups are not limited to the host species for which they are characteristic.

The results of the study of these 49 strains confirm the conclusions of Feusier and Meyer that their groups 1 and 2 are very closely related, and their group 3 (*melitensis* A) is sharply defined from groups 1 and 2. The results of this study are at variance with Feusier and Meyer's in that only 2 of the 49 strains were found belonging to their group 2 (a subvariety of *abortus*), whereas they classified 9 of their 14 strains in that serological group.

SUMMARY.

The agglutinin absorption tests with 49 strains of *Brucella melitensis* have shown that—

(1) This species may be differentiated into at least seven serological groups. Four of these groups included only one or two strains each, and were relatively unimportant.

(2) The majority of bovine and porcine strains fell into one large group (30 strains), which is designed variety *abortus*. Two strains of human origin were of this variety. Two of the small serological groups are so closely related to this one that they should be considered as subvarieties. One of these includes only one strain of bovine origin; the other includes two strains, both of human origin.

(3) Another important group includes strains of human, bovine, caprine, and equine origins (11 strains). It is designated variety *melitensis* A.

(4) A third group of three strains characterized morphologically by a predominance of coccoid cells assumes importance from the evidence that this was the variety that Bruce was working with when he named his newly discovered organism "*Micrococcus melitensis*." It is designated variety *melitensis* B.

Simple agglutination tests can not differentiate between varieties *abortus* and *melitensis* A. These two varieties can be differentiated from *melitensis* B by the simple agglutination test only when the titer of the serum used is accurately known for the several varieties.

REFERENCES.

American Public Health Association (1920): Standard methods for the examination of water and sewage. 4th ed. Boston. p. 4.

Bassett-Smith, P. W. (1921): Paramelitensis infection in man and animals. J. Trop. Med. and Hyg., *24*, 53–54.

Burnet, Et.:
(1922)—Sur les rapports du B. abortus (Bang) et du Micrococcus melitensis. Compt. rend. Acad. d. Sci., Paris, *175*, 790–793.
(1923)—Rapports du Micrococcus melitensis et du B. abortus de Bang. Arch. Inst. Pasteur de l'Afrique du Nord, *3*, 48–66.
Evans, Alice C.:
(1918)—Further studies on Bacterium abortus and related bacteria. II. A comparison of Bacterium abortus with Bacterium bronchisepticus and with the organism which causes Malta fever. J. Infect. Dis., *22*, 580–593.
(1922)—A buffered physiologic salt solution. Ibid., v. 30: 95–98.
(1923)—The nomenclature of the melitensis-abortus group of organisms. Pub. Health Rep., *38*, 1943–1948.
Feusier, M. L., and Meyer, K. F. (1920): Principles in serologic grouping of B. abortus and B. melitensis. Correlation between absorption and agglutination tests. Studies on the genus Brucella nov. gen. II. J. Infect. Dis., *27*, 185–206.
Fleischner, E. C., and Meyer, K. F. (1920): Preliminary observations on the pathogenicity for monkeys of the Bacillus abortus bovinus. Trans. Pediatric Soc., *32*, 141–146.
Fleischner, E. C., Meyer, K. F., and Shaw, E. B. (1919): A résumé of some experimental studies on cutaneous hypersensitiveness. Am. J. Dis. Children, *18*, 577-590.
Fleischner, E. C., Vecki, M., Shaw, E. B., and Meyer, K. F. (1921): The pathogenicity of B. abortus and B. melitensis for monkeys. Studies on the genus Brucella nov. gen. III. J. Infect. Dis., *29*, 663–698.
Huddleson, I. Forest (1922): The comparative pathogenicity of several strains of Bacterium abortus (Bang). Michigan Agric. Exper. Sta., Tech. Bull. 55, pp. 1–4.
Jaffé, R. Hermann (1922): Über die experimentelle Infektion des Meerschweinchens mit dem Bac. melitensis (Bruce) und dem Bac. abortus (Bang). Virchow's Arch. f. path. Anat. u. Physiol., Berlin, *238*, 119–134.
Khaled, Z. (1921): A comparative study of bovine abortion and undulant fever, from the bacteriological point of view. J. Hyg., Cambridge, Eng., *20*, 319–329.
Lake, G. C. (1922): Malta fever in southwestern United States. With special reference to a recent outbreak in Phoenix, Ariz. Pub. Health Rep., *37*, 2895–2899.
Meyer, K. F., Fleischner, E. C., and Shaw, E. B. (1919): The pathogenicity of Bacterium melitensis for guinea pigs. Proc. Soc. Exper. Biol. and Med., *16*, 152–156.
Meyer, K. F., and Shaw, E. B. (1920): A comparison of the morphologic, cultural, and biochemical characteristics of B. abortus and B. melitensis. Studies on the genus Brucella nov. gen. I. J. Infect. Dis., *27*, 173–184.
Meyer, K. F., Shaw, E. B., and Fleischner, E. C. (1922): The pathogenicity of B. melitensis and B. abortus for guinea pigs. Studies on the genus Brucella nov. gen. IV. J. Infect. Dis., *31*, 159–197.
Nègre, L., and Raynaud, M.:
(1912)—Melitensis et paramelitensis. Compt. rend. Soc. de biol., Paris, *72*, 791–793.
(1912)—Identification des paramelitensis par l'épreuve de la saturation des agglutinines. Ibid., 1052–1054.
Skarić, J. (1922): Über die Beziehungen des Bac. melitensis (Bruce) zum Bac. abortus infect. bovum (Bang). Ztschr. f. Hyg. u. Infektionskr., *95*, 358–364.
Zeller (1920): Beziehungen zwischen dem Erreger des infektiösen Abortus der Rinder und des Maltafiebers. Berlin. tierärztl. Wchnschr., *36*, 345–347.

THE "DEVIL'S GRIP" IN VIRGINIA.

By C. ARMSTRONG, Passed Assistant Surgeon, United States Public Health Service.

On July 23, 1923, at the request of State Health Commissioner Dr. E. G. Williams, of Virginia, the writer accompanied State Epidemiologist Dr. George C. Payne to Bowling Green and vicinity for the purpose of investigating an outbreak of a disease of unknown etiology.

From various physicians in Caroline, Hanover, and King William Counties it was learned that there had been in their practices for the past month an epidemic of unknown etiology, the like of which they had not previously encountered. The symptoms, as described by physicians, patients, and parents were striking and practically identical. They suggested to the writer an outbreak described by Prof. W. C. Dabney, M. D., of the University of Virginia,[1] which occurred in June, 1888, in and about Charlottesville and among the students of the university. (Dabney suggested a relationship with dengue fever, but he recognized wherein the two diseases differed, and it seems certain that they are distinct.) During that epidemic in Rappahannock County, Va., a sufferer, on account of the severe pains, nicknamed the ailment "devil's grip." From the description given by Dabney it seems that he was dealing with the same ailment observed in 1923, a brief preliminary description of which is given here.

The patients visited were found to be principally children, several usually being affected in the same home. The onset was sudden, and often startling to the parents, beginning with an acute, severe pain usually of the epigastrium, which later shifted to the right or left side of the chest. In some cases the pain began in the chest, and in a few it radiated to the right or left shoulder. The pains were described as intermittent in some cases. The respirations were shallow, increased in rate, were quite painful (especially on deep inspiration), and were usually accompanied by a grunt. The temperature rose rapidly to 101°–103°; the pulse was usually moderately increased in rate. Headache occurred in some cases; vomiting was rare. The bowels were somewhat constipated or normal. The appetite was impaired. Hiccough was present in a few cases, and sweating was common at some time during the attack. The symptoms were transitory; the fever and pain usually subsided in from 12 to 36 hours, and, as a rule, did not recur. One child was seen, however, who had suffered three attacks, occurring, approximately, on alternate nights. There were no chills.

[1] An account of an epidemic resembling dengue, which occurred in and around Charlottesville and the University of Virginia in June, 1888. By William C. Dabney. American Journal of the Medical Sciences, vol. 96, pp. 488–494.

Upon physical examination the physicians of the neighborhood were unable to find any adequate cause for the symptoms. Examinations made by the writer in a few cases just recovering revealed no lung involvement or other apparent cause, except in one case. This child began, it is said, with typical symptoms, but failed to recover, and when seen after a week there was involvement at the base of one lung and the mouth was surrounded by herpes. The transitory nature of the ailment and the fact that the disease was occurring throughout one of the most sparsely settled rural sections of Virginia prevented the writer from seeing a case in the early and more active stages. The disease is, however, being investigated by the State Department of Health, and a more detailed report will be made later. The writer heard of no deaths being attributed to the disease.

Judgment as to whether or not the condition here described is a separate clinical entity should remain suspended until further evidence is available.

MOSQUITO CONTROL IN BRUNSWICK, GA.

Reports coming to the Public Health Service from the quarantine station at Brunswick, Ga., indicate the success of mosquito control measures in that locality. During the months of April, May, and June, the report states, there was an entire absence of mosquitoes in Brunswick. This freedom from mosquitoes was due in part to the war made on mosquito breeding during the winter and spring months and in part to the prevailing temperature. The temperature up to the end of June was not conducive to productive breeding. With the advent of July, warmer weather and frequent rains produced conditions more favorable to mosquito propagation. The temperature for July ranged from 70° to 90° in the shade, with a mean temperature of 80° F.

Up to the end of July no stegomyia were observed. If stegomyia were breeding, they were passive. During July there was practically an absence of mosquitoes in Brunswick and the neighboring vicinities. This situation was unquestionably due to the active measures taken by the civic and county authorities to suppress mosquito breeding. The only mosquitoes observed during the month of July were the Culex and Anopheles, which appeared during the week of July 28. This invasion was mild, and measures were immediately taken to suppress further invasion and to keep the city free from malaria.

This work of malaria suppression and control in Georgia is being carried on under the direction of the sanitary department of Brunswick and the local board of health. Experienced officers are in charge. Ample help and facilities have been provided for the abatement of

all mosquito-breeding places and the destruction of all larvæ. Sanitary inspectors are employed to see that all property owners and tenants keep their property free from standing water exposed in such way as to provide a breeding place for mosquitoes. Penalties are also provided for persons who are negligent in observing the sanitary ordinances.

At the end of July the status of the public health in Brunswick and, in fact, throughout Glynn County, was remarkably good. There were but few cases of malaria, still fewer cases of typhoid, no dengue, and no diseases of a quarantinable kind.

DEATHS DURING WEEK ENDED AUGUST 11, 1923.

Summary of information received by telegraph from industrial insurance companies for week ended August 11, 1923, and corresponding week of 1922. (From the Weekly Health Index, August 14, 1923, issued by the Bureau of the Census, Department of Commerce.)

	Week ended Aug. 11, 1923.	Corresponding week, 1922.
Policies in force	54,387,055	49,782,150
Number of death claims	7,031	7,401
Death claims per 1,000 policies in force, annual rate	6.7	7.8

Deaths from all causes in certain large cities of the United States during the week ended August 11, 1923, infant mortality, annual death rate, and comparison with corresponding week of 1922. (From the Weekly Health Index, August 14, 1923, issued by the Bureau of the Census, Department of Commerce.)

City.	Week ended Aug. 11, 1923.		Annual death rate per 1,000, corresponding week, 1922.	Deaths under 1 year.		Infant mortality rate, week ended Aug. 11, 1923.[3]
	Total deaths.	Death rate.[1]		Week ended Aug. 11, 1923.	Corresponding week, 1922.	
Total	5,778	10.3	10.1	846	882	.....
Akron, Ohio	19	4.8	4.8	4	3	47
Albany, N. Y.[3]	19	8.4	11.2	2	1	44
Atlanta, Ga.	80	18.7	15.6	13	8	.....
Baltimore, Md.[3]	180	12.1	11.6	31	40	91
Birmingham, Ala.	41	10.9	11.2	5	6	.....
Boston, Mass.	150	10.2	12.8	18	30	52
Bridgeport, Conn.	25	9.1	9.4	2	5	28
Buffalo, N. Y.	103	10.0	13.1	17	27	71
Cambridge, Mass.	26	12.2	9.4	5	2	89
Camden, N. J.[3]	32	13.4	12.0	6	9	99
Chicago, Ill.	492	8.9	9.8	75	82	.....
Cincinnati, Ohio	123	15.8	10.0	15	6	99
Cleveland, Ohio[3]	139	8.2	8.5	24	28	66
Columbus, Ohio.	71	14.2	11.9	14	7	145
Dallas, Tex.	45	13.2	9.1	11	3	.....
Dayton, Ohio	30	9.5	10.0	9	3	148
Denver, Colo.	58	11.1	11.7	13	7	.....
Des Moines, Iowa	22	8.1	.....	0	.....	.....
Detroit, Mich.	190	10.0	9.4	36	41	72
Duluth, Minn.	15	7.4	.....	0	.....	0
Erie, Pa.	17	7.9	7.6	1	1	20
Fall River, Mass.[3]	28	12.1	11.7	7	5	99

[1] Annual rate per 1,000 population.
[2] Deaths under 1 year per 1,000 births—an annual rate based on deaths under 1 year for the week and estimated births for 1922. Cities left blank are not in the registration area for births.
[3] Deaths for week ended Friday, Aug. 10, 1923.

Deaths from all causes in certain large cities of the United States during the week ended August 11, 1923, infant mortality, annual death rate, and comparison with corresponding week of 1922. (From the Weekly Health Index, August 14, 1923, issued by the Bureau of the Census, Department of Commerce.)—Continued.

City.	Week ended Aug. 11, 1923.		Annual death rate per 1,000, corresponding week, 1922.	Deaths under 1 year.		Infant mortality rate, week ended Aug. 11, 1923.
	Total deaths.	Death rate.		Week ended Aug. 11, 1923.	Corresponding week, 1922.	
Flint, Mich.	23	10.2	.....	6	.....	119
Fort Worth, Tex.	24	8.7	7.7	7	4	.....
Grand Rapids, Mich.	22	7.9	7.3	6	3	95
Houston, Tex.	40	13.5	7.6	2	2	.....
Indianapolis, Ind.	87	13.2	10.9	9	11	69
Jacksonville, Fla.	27	14.1	10.1	2	3	.....
Jersey City, N. J.	65	11.0	8.5	5	15	34
Kansas City, Kans.	22	9.9	13.3	4	5	92
Kansas City, Mo.	78	11.6	9.7	20	14	.....
Los Angeles, Calif.	163	12.7	13.1	15	17	56
Lowell, Mass.	24	10.9	10.0	5	4	87
Lynn, Mass.	19	9.6	.....	2	.....	53
Memphis, Tenn.	45	13.8	10.9	8	5	.....
Milwaukee, Wis.	75	8.1	7.4	13	7	65
Minneapolis, Minn.	70	8.9	11.7	7	11	38
Nashville, Tenn.	41	17.6	18.2	4	7	.....
New Bedford, Mass.	20	8.0	7.8	2	4	31
New Haven, Conn.	34	10.2	13.2	5	8	65
New Orleans, La.	130	16.8	12.9	15	10	.....
New York, N. Y.	1,085	9.5	9.2	148	163	59
Bronx Borough	103	6.4	7.8	8	12	28
Brooklyn Borough	359	8.7	8.8	51	66	54
Manhattan Borough	501	11.5	10.1	76	67	74
Queens Borough	90	8.8	7.8	7	17	37
Richmond Borough	32	13.1	12.6	6	1	109
Newark, N. J.	80	9.5	10.1	10	23	47
Norfolk, Va.	34	11.1	12.1	8	7	141
Oakland, Calif.	43	9.3	9.8	3	3	39
Omaha, Nebr.	56	14.3	8.6	7	2	76
Paterson, N. J.	15	5.6	7.5	1	3	16
Philadelphia, Pa.	358	9.7	11.2	54	82	70
Pittsburgh, Pa.	137	11.6	10.5	30	22	104
Portland, Oreg.	39	7.4	12.0	5	4	51
Providence, R. I.	46	9.9	10.8	7	13	57
Richmond, Va.	55	15.8	9.9	11	6	135
Rochester, N. Y.	53	8.7	7.0	9	10	71
St. Louis, Mo.	171	11.1	8.8	27	15	.....
St. Paul, Minn.	42	9.1	10.2	6	7	55
Salt Lake City, Utah [1]	23	9.5	13.0	2	6	33
San Antonio, Tex.	40	11.3	12.6	6	11	.....
San Francisco, Calif.	115	11.1	10.2	9	3	54
Seattle, Wash.	59	9.8	7.4	6	1	53
Spokane, Wash.	16	8.0	7.0	2	2	44
Springfield, Mass.	24	8.7	10.4	6	8	86
Syracuse, N. Y.	43	12.2	8.6	1	7	13
Tacoma, Wash.	10	5.1	.....	0	.....	0
Toledo, Ohio.	64	12.4	7.4	8	7	81
Trenton, N. J.	16	6.5	15.0	0	8	0
Utica, N. Y.	18	9.1	.....	3	.....	64
Washington, D. C.	131	15.6	11.6	18	8	103
Wilmington, Del.	23	10.2	12.6	0	4	0
Worcester, Mass.	28	7.6	9.4	5	4	57
Yonkers, N. Y.	20	9.7	9.4	3	5	65
Youngstown, Ohio.	20	7.9	8.3	6	4	81

[1] Deaths for week ended Friday, Aug. 10, 1923.

PREVALENCE OF DISEASE.

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring.

UNITED STATES.

CURRENT STATE SUMMARIES.

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

Reports for Week Ended August 18, 1923.

ALABAMA.

	Cases.
Chicken pox	17
Diphtheria	31
Dysentery	38
Malaria	283
Measles	79
Pellagra	8
Pneumonia	17
Poliomyelitis	4
Scarlet fever	18
Smallpox	1
Tuberculosis	37
Typhoid fever	79
Whooping cough	22

ARIZONA.

Diphtheria	3
Scarlet fever	2
Tuberculosis	78
Typhoid fever	1

ARKANSAS.

Chicken pox	22
Diphtheria	4
Hookworm disease	2
Influenza	7
Malaria	314
Measles	15
Paratyphoid fever	1
Pellagra	13
Poliomyelitis	1
Scarlet fever	5
Smallpox	2
Trachoma	2
Tuberculosis	16
Typhoid fever	48
Whooping cough	22

CALIFORNIA.

	Cases.
Anthrax	1
Cerebrospinal meningitis	1
Diphtheria	100
Influenza	4
Lethargic encephalitis	1
Measles	158
Poliomyelitis:	
Hanford	1
Los Angeles	1
Pasadena	1
San Fernando	1
Scarlet fever	38
Smallpox	16
Typhoid fever	41
Typhus fever—Los Angeles	2

COLORADO.

(Exclusive of Denver.)

Cerebrospinal meningitis	1
Diphtheria	16
Measles	22
Scarlet fever	11
Tuberculosis	47
Typhoid fever	4
Whooping cough	3

CONNECTICUT.

Chicken pox	5
Diphtheria	28
German measles	3
Influenza	2
Lethargic encephalitis	2
Malaria	4
Measles	15
Mumps	5

CONNECTICUT—continued.

	Cases.
Pneumonia (lobar)	7
Poliomyelitis	6
Scarlet fever	15
Smallpox	11
Tetanus	1
Tuberculosis (all forms)	42
Typhoid fever	22
Whooping cough	51

FLORIDA.

Cerebrospinal meningitis	2
Diphtheria	12
Influenza	2
Malaria	44
Poliomyelitis	1
Typhoid fever	8

GEORGIA.

Cerebrospinal meningitis	2
Chicken pox	1
Diphtheria	13
Influenza	4
Hookworm disease	19
Malaria	62
Measles	27
Paratyphoid fever	2
Pneumonia	10
Scarlet fever	2
Smallpox	17
Tetanus	1
Trachoma	2
Tuberculosis (pulmonary)	14
Typhoid fever	26
Whooping cough	10

ILLINOIS.

Cerebrospinal meningitis:	
Cook County	2
Winnebago County	1
Diphtheria:	
Cook County	63
Scattering	27
Influenza	4
Lethargic encephalitis—Cook County	1
Pneumonia	74
Poliomyelitis:	
Clark County	1
Cook County	4
Crawford County	1
Hardin County	2
Livingstone County	1
Scarlet fever	52
Smallpox	7
Typhoid fever:	
Cook County	3
Scattering	43
Whooping cough	155

INDIANA.

Diphtheria	23
Influenza	5
Measles	9
Scarlet fever	25
Smallpox	11
Tuberculosis	38
Typhoid fever	11

IOWA.

	Cases.
Diphtheria	15
Scarlet fever	13
Smallpox	1
Typhoid fever	9

KANSAS.

Cerebrospinal meningitis	1
Chicken pox	1
Diphtheria	20
Dysentery	1
Influenza	5
Malaria	2
Measles	33
Mumps	15
Pneumonia	1
Poliomyelitis	30
Scarlet fever	31
Smallpox	4
Tetanus	1
Tuberculosis	22
Typhoid fever	57
Whooping cough	61

LOUISIANA.

Dengue	4
Diphtheria	14
Malaria	16
Measles	13
Scarlet fever	2
Smallpox	2
Tuberculosis	32
Typhoid fever	36
Whooping cough	7

MAINE.

Diphtheria	4
Measles	62
Mumps	1
Pneumonia	1
Scarlet fever	27
Tetanus	1
Tuberculosis	16
Typhoid fever	5
Whooping cough	8

MARYLAND.[1]

Cerebrospinal meningitis	1
Chicken pox	2
Diphtheria	20
Dysentery	26
German measles	2
Influenza	6
Malaria	18
Measles	42
Mumps	4
Paratyphoid fever	3
Pneumonia (all forms)	19
Scarlet fever	26
Smallpox	1
Tetanus	1
Tuberculosis	69
Typhoid fever	79
Whooping cough	69

[1] Week ended Friday, Aug. 17, 1923.

MASSACHUSETTS.

	Cases.
Cerebrospinal meningitis	3
Chicken pox	30
Conjunctivitis (suppurative)	9
Diphtheria	151
German measles	3
Influenza	3
Lethargic encephalitis	2
Measles	76
Mumps	21
Ophthalmia neonatorum	19
Pneumonia (lobar)	20
Poliomyelitis	9
Scarlet fever	62
Septic sore throat	1
Tetanus	1
Trachoma	2
Trichinosis	1
Tuberculosis (all forms)	141
Typhoid fever	12
Whooping cough	86

MICHIGAN.

Diphtheria	109
Measles	109
Pneumonia	53
Scarlet fever	105
Smallpox	18
Tuberculosis	44
Typhoid fever	26
Whooping cough	149

MINNESOTA.

Diphtheria	45
Influenza	2
Measles	18
Pneumonia	2
Poliomyelitis	3
Scarlet fever	94
Smallpox	4
Tuberculosis	110
Typhoid fever	13
Whooping cough	4

MISSISSIPPI.

Diphtheria	20
Scarlet fever	3
Smallpox	3
Typhoid fever	40

MISSOURI.

(Exclusive of Cape Girardeau and St. Louis.)

Chicken pox	4
Diphtheria	13
Measles	37
Mumps	4
Poliomyelitis	2
Scarlet fever	12
Septic sore throat	2
Trachoma	2
Tuberculosis	28
Typhoid fever	19
Whooping cough	44

MONTANA.

	Cases.
Diphtheria	5
Scarlet fever	9
Smallpox	1
Typhoid fever	11

NEW JERSEY.

Cerebrospinal meningitis	3
Chicken pox	10
Diphtheria	78
Influenza	3
Malaria	4
Measles	23
Paratyphoid fever	1
Pneumonia	32
Poliomyelitis	7
Scarlet fever	24
Trachoma	1
Typhoid fever	19
Whooping cough	52

NEW MEXICO.

Diphtheria	20
Malaria	4
Measles	2
Scarlet fever	1
Septic sore throat	1
Tuberculosis	8
Typhoid fever	4
Whooping cough	1

NEW YORK.

(Exclusive of New York City.)

Cerebrospinal meningitis	2
Diphtheria	58
Influenza	8
Lethargic encephalitis	3
Measles	215
Pneumonia	49
Poliomyelitis	17
Scarlet fever	85
Smallpox	16
Typhoid fever	55
Whooping cough	147

NORTH CAROLINA.

Cerebrospinal meningitis	1
Chicken pox	7
Diphtheria	76
German measles	1
Measles	145
Scarlet fever	28
Septic sore throat	1
Smallpox	25
Typhoid fever	86
Whooping cough	138

OREGON.

Chicken pox	3
Diphtheria	5
Measles	4
Scarlet fever	8
Smallpox	6
Typhoid fever	6
Whooping cough	1

SOUTH DAKOTA.

	Cases.
Diphtheria	2
Measles	10
Mumps	1
Scarlet fever	15
Tetanus	1
Tuberculosis	4
Typhoid fever	3
Whooping cough	2

TEXAS.

Chicken pox	2
Dengue	7
Diphtheria	13
Measles	12
Mumps	1
Paratyphoid fever	2
Pneumonia	1
Scarlet fever	8
Smallpox	1
Trachoma	1
Tuberculosis	19
Typhoid fever	30
Typhus fever	1
Whooping cough	23

VERMONT.

Chicken pox	2
Diphtheria	1
Measles	30
Mumps	1
Scarlet fever	3
Smallpox	3
Typhoid fever	1
Whooping cough	15

VIRGINIA.

Cerebrospinal meningitis	1
Poliomyelitis:	
Appomatox County	1
Spotsylvania County	1

WASHINGTON.

Chicken pox	17
Diphtheria	18

WASHINGTON—continued.

	Cases.
Dysentery	1
Lethargic encephalitis	1
Measles	19
Mumps	8
Scarlet fever	20
Septic sore throat	1
Smallpox	17
Tuberculosis	40
Typhoid fever:	
Everett	24
Scattering	9
Whooping cough	40

WEST VIRGINIA.

Diphtheria	3
Scarlet fever	10

WISCONSIN.

Milwaukee:	
Chicken pox	5
Diphtheria	13
Scarlet fever	10
Smallpox	3
Tuberculosis	4
Whooping cough	31
Scattering:	
Chicken pox	10
Diphtheria	43
Influenza	4
Measles	75
Pneumonia	3
Poliomyelitis	1
Scarlet fever	37
Smallpox	1
Tuberculosis	37
Typhoid fever	9
Whooping cough	74

WYOMING.

Diphtheria	1
Measles	8
Scarlet fever	2
Whooping cough	11

Reports for Week Ended August 11, 1923.

MASSACHUSETTS.

	Cases.
Cerebrospinal meningitis	3
Chicken pox	24
Conjunctivitis (suppurative)	7
Diphtheria	106
German measles	2
Influenza	2
Lethargic encephalitis	3
Malaria	1
Measles	69
Mumps	18
Ophthalmia neonatorum	12
Pellagra	1
Pneumonia (lobar)	10
Poliomyelitis	2
Scarlet fever	63
Septic sore throat	1
Tuberculosis (all forms)	102
Typhoid fever	15
Whooping cough	78

NEBRASKA.

	Cases.
Cerebrospinal meningitis	1
Diphtheria	9
Malaria	1
Measles	2
Mumps	2
Pneumonia	1
Poliomyelitis	6
Scarlet fever	5
Tuberculosis	3
Typhoid fever	3
Whooping cough	4

NORTH DAKOTA.

Chicken pox	1
Diphtheria	14
Measles	17
Scarlet fever	6
Smallpox	6
Tuberculosis	4
Typhoid fever	2

SUMMARY OF CASES REPORTED MONTHLY BY STATES.

The following summary of monthly State reports is published weekly and covers only those States from which reports are received during the current week:

State.	Cerebrospinal meningitis.	Diphtheria.	Influenza.	Malaria.	Measles.	Pellagra.	Poliomyelitis.	Scarlet fever.	Smallpox.	Typhoid fever.
June, 1923.										
Colorado	2	169	.....	.....	1,090	.....	.....	77	1	21
New Mexico	.....	83	1	.....	154	1	.....	22	1	8
Wyoming	.....	1	.....	.....	97	.....	.....	8	1	1
July, 1923.										
New Jersey	6	291	7	18	645	.....	13	114	17	53
New Mexico	.....	84	.....	1	45	.....	.....	1	.....	31
North Carolina	4	144	.....	.....	1,754	.....	2	51	118	461
Vermont	.....	15	.....	.....	483	.....	1	29	22	2
Wisconsin	4	255	26	.....	1,360	.....	4	448	67	27

CITY REPORTS FOR WEEK ENDED AUGUST 4, 1923.

CEREBROSPINAL MENINGITIS.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding week of the years 1915 to 1922, inclusive. In instances in which data for the full eight years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended Aug. 4, 1923.		City.	Median for previous years.	Week ended Aug. 4, 1923.	
		Cases.	Deaths.			Cases.	Deaths.
District of Columbia:				New York:			
Washington	0	1	1	New York	4	3	.....
Illinois:				North Carolina:			
Chicago	1	2	.....	Durham	0	.....	1
Massachusetts:				Pennsylvania:			
Fall River	0	.....	1	Wilkes-Barre	0	3	.....
Framingham	0	1	1	Wisconsin:			
Michigan:				Milwaukee	1	1	.....
Detroit	0	2	.....				

DIPHTHERIA.

See p. 1977; also Current State summaries, p. 1968, and Monthly summaries by States, above.

INFLUENZA.

City.	Cases.		Deaths, week ended Aug. 4, 1923.	City.	Cases.		Deaths, week ended Aug. 4, 1923.
	Week ended Aug. 5, 1922.	Week ended Aug. 4, 1923.			Week ended Aug. 5, 1922.	Week ended Aug. 4, 1923.	
Alabama:				Massachusetts:			
Montgomery	.....	1	1	Springfield	.....	.....	1
California:				New York:			
Los Angeles	2	1	.....	New York	9	6	2
San Diego	.....	.....	1	Pennsylvania:			
District of Columbia:				Philadelphia	.....	1	2
Washington	.....	2	.....	Texas:			
Illinois:				Dallas	.....	.....	2
Chicago	1	2	1	West Virginia:			
Springfield	.....	1	.....	Charleston	.....	4	.....
Maryland:							
Baltimore	.....	1	.....				
Frederick	.....	1	.....				

CITY REPORTS FOR WEEK ENDED AUGUST 4, 1923—Continued.

LETHARGIC ENCEPHALITIS.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
California:					
San Francisco	2	1			

MALARIA.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
Alabama:			Louisiana:		
Birmingham	11		New Orleans	1	
Dothan	1		Massachusetts:		
Montgomery	2		Boston	1	
Tuscaloosa	1		New Jersey:		
Arkansas:			East Orange	1	
Little Rock	5		Hoboken	1	
California:			New York:		
Sacramento	1		New York	2	
San Francisco	1		Ohio:		
Stockton		1	Cleveland	3	
Georgia:			Tennessee:		
Albany	3		Memphis	17	
Augusta		1	Nashville	1	
Brunswick	7		Texas:		
Macon	3		Dallas	1	
Rome	2				
Illinois:					
Elgin	1				

MEASLES.

See p. 1977; also Current State summaries, p. 1968, and Monthly summaries by States, p. 1972.

PELLAGRA.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
Alabama:			North Carolina:		
Birmingham		1	Durham		1
Tuscaloosa	1		Pennsylvania:		
California:			Philadelphia		2
Los Angeles	1		South Carolina:		
Georgia:			Columbia		3
Atlanta		1	Virginia:		
New York:			Charlottesville		1
New York		1			

PNEUMONIA (ALL FORMS).

City.	Cases.	Deaths.	City.	Cases.	Deaths.
Alabama:			Illinois—Continued.		
Birmingham	6	3	Freeport		2
Montgomery	1		Galesburg		1
California:			Peoria		2
Bakersfield		1	Quincy		1
Los Angeles	26	9	Indiana:		
Oakland		1	Fort Wayne		3
Pasadena		1	Indianapolis		8
Sacramento		1	South Bend		2
San Diego	2	1	Kansas:		
San Francisco		5	Kansas City	1	
Connecticut:			Topeka		2
Bridgeport	2	1	Kentucky:		
Hartford	1		Covington		2
New Haven		4	Lexington		1
New London		1	Louisville		2
Waterbury		2	Louisiana:		
Georgia:			New Orleans		10
Atlanta		9	Maine:		
Augusta		1	Bath		1
Illinois:			Portland		1
Bloomington		1	Maryland:		
Chicago	50	22	Baltimore		9
East St. Louis		1			

CITY REPORTS FOR WEEK ENDED AUGUST 4, 1923—Continued.

PNEUMONIA (ALL FORMS)—Continued.

City.	Cases.	Deaths.
Massachusetts:		
Boston		10
Cambridge		2
Chelsea		1
Clinton		1
Fall River		2
Haverhill	1	
Lawrence	2	1
Malden		1
Methuen		1
New Bedford		3
Quincy	1	
Springfield	1	
Wakefield	1	
Michigan:		
Ann Arbor		1
Detroit	22	12
Flint		3
Hamtramck		1
Kalamazoo	3	1
Minnesota:		
Duluth	1	
Montana:		
Billings	1	
Nebraska:		
Omaha		1
New Jersey:		
Atlantic City		2
Englewood	3	1
Jersey City	1	
Orange	1	
Plainfield		3
Trenton		2
New York:		
Albany	6	
Amsterdam		1
Auburn		1
Elmira		2
Hudson		2
Lackawanna	3	1
Mount Vernon	1	
New York	90	62
Peekskill	2	1
New York—Continued.		
Rochester	3	1
Rome	1	
Schenectady	5	1
Syracuse	5	2
Watertown	4	1
White Plains		2
Ohio:		
Akron	1	
Canton		4
Cincinnati		7
Cleveland	12	9
Columbus		4
Dayton	1	
East Cleveland	1	
Hamilton		1
Newark		2
Salem		1
Youngstown		1
Oregon:		
Portland		2
Pennsylvania:		
Philadelphia	21	13
Pittsburgh		21
Rhode Island:		
Providence		2
South Carolina:		
Greenville		1
Tennessee:		
Memphis		2
Nashville		3
Texas:		
Dallas		1
El Paso		1
Utah:		
Provo	2	1
Virginia:		
Norfolk	1	
Petersburg		1
Richmond	1	
West Virginia:		
Clarksburg		1

POLIOMYELITIS (INFANTILE PARALYSIS).

The column headed "Median for previous years" gives the median number of cases reported during the corresponding week of the years 1915 to 1922, inclusive. In instances in which data for the full eight years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended Aug. 4, 1923.	
		Cases.	Deaths.
California:			
Glendale		1	1
Sacramento		1	
San Francisco	0	1	
Connecticut:			
Hartford	0	1	
New London	0	1	
Illinois:			
Chicago	4	2	
Freeport	0	1	
Indiana:			
Indianapolis	0	1	1
Kansas:			
Topeka	0	1	
Massachusetts:			
Boston	2	1	
Leominster	0	1	
Nebraska:			
Omaha	0	7	
New York:			
Jamestown	0	1	
Newburgh	0	1	
Ohio:			
East Cleveland	0	1	1
Pennsylvania:			
Wilkes-Barre	0	3	
Vermont:			
Burlington	0	1	
West Virginia:			
Huntington	0	1	0
Wisconsin:			
Milwaukee	0	2	1

CITY REPORTS FOR WEEK ENDED AUGUST 4, 1923—Continued.

RABIES IN ANIMALS.

City.	Cases.	City.	Cases.
California:		New Jersey:	
Los Angeles	2	Kearny	1
Pasadena	2	Orange	1
Massachusetts:		New Mexico:	
Malden	1	Albuquerque	1
Watertown	1	Texas:	
		Dallas	1

RABIES IN MAN.

City.	Cases.	Deaths.
Montana:		
Billings	1	1

SCARLET FEVER.

See p. 1977; also Current State summaries, p. 1968, and Monthly summaries by States, p. 1972.

SMALLPOX.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding week of the years 1915 to 1922, inclusive. In instances in which data for the full eight years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended Aug. 4, 1923.		City.	Median for previous years.	Week ended Aug. 4, 1923.	
		Cases.	Deaths.			Cases.	Deaths.
California:				North Dakota:			
Los Angeles	0	20	.....	Fargo	0	2	.....
San Diego	0	1	.....	Ohio:			
San Francisco	0	1	.....	Cleveland	1	1	.....
District of Columbia:				Mansfield	0	1	.....
Washington	0	1	.....	Oregon:			
Georgia:				Portland	2	3	.....
Atlanta	0	8	.....	Pennsylvania:			
Illinois:				Chester	0	1	.....
Chicago	0	1	.....	Pittsburgh	0	2	.....
Indiana:				Tennessee:			
Gary	1	1	.....	Chattanooga	0	1	.....
Huntington	0	1	.....	Texas:			
Muncie	0	1	.....	Dallas	0	2	.....
Michigan:				Vermont:			
Detroit	2	4	.....	Burlington	0	3	.....
Flint	1	1	.....	West Virginia:			
Minnesota:				Charleston	0	4	.....
Duluth	0	1	.....	Wisconsin:			
St. Paul	2	3	.....	Kenosha	0	1	.....
Montana:				Milwaukee	2	1	.....
Missoula	0	2	.....	Oshkosh	0	2	.....
New Jersey:				Racine	0	2	.....
Trenton	0	4	.....				

CITY REPORTS FOR WEEK ENDED AUGUST 4, 1923—Continued.

TETANUS.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
California:			Massachusetts:		
Glendale	1	1	Fall River	1	.....
Los Angeles	1	.....	Missouri:		
Illinois:			St. Louis	1	1
Chicago	1	1	New York:		
Indiana:			Elmira	1	1
Indianapolis	.....	1	New York	2	2
Kansas:			Syracuse	.....	1
Kansas City	1	.....	Ohio:		
Kentucky:			Canton	.....	1
Lexington	.....	1	South Carolina:		
Maryland:			Charleston	.....	1
Baltimore	.....	1	Tennessee:		
Cumberland	1	1	Nashville	.....	1

TUBERCULOSIS.

See p. 1977; also Current State summaries, p. 1968.

TYPHOID FEVER.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding week of the years 1915 to 1922, inclusive. In instances in which data for the full eight years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended Aug. 4, 1923.		City.	Median for previous years.	Week ended Aug. 4, 1923.	
		Cases.	Deaths.			Cases.	Deaths.
Alabama:				Maryland:			
Birmingham	9	3	.....	Baltimore	11	11	.....
Montgomery	1	2	.....	Frederick	0	1	.....
Tuscaloosa	0	3	.....	Massachusetts:			
Arkansas:				Beverly	0	1	.....
Little Rock	2	5	.....	Haverhill	0	.....	1
California:				Lawrence	1	1	.....
Los Angeles	3	1	.....	Lowell	0	1	.....
Sacramento	1	1	.....	Springfield	0	1	.....
San Diego	0	1	.....	Taunton	0	1	.....
San Francisco	5	1	.....	Watertown	0	1	.....
Stockton	0	2	1	Michigan:			
Connecticut:				Detroit	10	2	1
Hartford	2	1	.....	Grand Rapids	0	4	.....
New Haven	2	1	.....	Kalamazoo	0	2	.....
Georgia:				Minnesota:			
Atlanta	3	2	.....	St. Paul	1	5	.....
Augusta	.....	.....	1	Winona	0	1	.....
Macon	2	6	.....	Missouri:			
Rome	2	2	.....	St. Louis	10	10	.....
Illinois:				Montana:			
Bloomington	0	1	.....	Great Falls	1	1	1
Chicago	5	3	1	Helena	0	1	.....
Pekin	0	1	.....	Nebraska:			
Peoria	0	8	.....	Omaha	0	1	.....
Springfield	0	1	.....	Nevada:			
Indiana:				Reno	0	1	.....
Bloomington	0	2	.....	New Jersey:			
Fort Wayne	0	2	.....	Elizabeth	0	1	.....
Indianapolis	4	4	.....	Jersey City	1	1	.....
Kansas:				Perth Amboy	0	2	1
Coffeyville	1	3	.....	Trenton	1	1	.....
Parsons	0	1	.....	New York:			
Topeka	2	1	.....	Albany	1	4	.....
Kentucky:				Hornell	0	1	.....
Covington	0	2	.....	Jamestown	0	1	.....
Lexington	0	1	1	New York	24	17	1
Louisville	7	3	.....	Rochester	1	3	.....
Owensboro	0	4	.....	Schenectady	1	1	.....
Paducah	2	1	.....	White Plains	0	1	.....
Louisiana:							
New Orleans	5	5	1				

CITY REPORTS FOR WEEK ENDED AUGUST 4, 1923—Continued.

TYPHOID FEVER—Continued.

City.	Median for previous years.	Week ended Aug. 4, 1923.	
		Cases.	Deaths.
Ohio:			
Cincinnati	3	1	3
Cleveland	5	6	.....
Columbus	2	2	2
Coshocton	0	1	.....
Dayton	2	1	.....
Hamilton	0	.....	1
Lima	0	1	1
Mansfield	0	.....	1
Springfield	1	1	1
Steubenville	0	1	.....
Toledo	4	3	.....
Oklahoma:			
Tulsa	5	9	.....
Pennsylvania:			
Braddock	0	1	.....
Carrick	0	1	.....
Chester	1	4	.....
Norristown	0	1	.....
Philadelphia	12	5	.....
Pittsburgh	6	.....	1
Reading	1	1	.....
West Chester	0	2	.....
Rhode Island:			
Providence	1	2	.....
South Carolina:			
Charleston	3	5	.....
Columbia	1	3	.....
Greenville	0	2	.....
Tennessee:			
Chattanooga	1	2	.....
Memphis	3	16	1
Nashville	9	4	1
Texas:			
Dallas	5	2	1
Waco	0	2	.....
Utah:			
Provo	.....	1	.....
Salt Lake City	1	2	.....
Virginia:			
Charlottesville	0	1	.....
Lynchburg	2	2	.....
Norfolk	2	3	.....
Petersburg	1	2	.....
Richmond	1	5	1
West Virginia:			
Clarksburg	1	1	.....
Huntington	0	1	.....
Wisconsin:			
Janesville	0	1	.....

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Alabama:										
Birmingham	178,806	61	1	.....	15	.....	2	.....	12	3
Dothan	10,034	2	1	.....	2	.....	.....	.....	1	.....
Montgomery	43,464	22	.....	.....	.....	.....	.....	.....	1	1
Arkansas:										
Little Rock	65,142	.....	.....	.....	1	.....	1	.....	.....	.....
North Little Rock	14,048	.....	.....	.....	.....	.....	.....	.....	1	.....
California:										
Alameda	28,806	2	.....	.....	4	.....	.....	.....	.....	.....
Bakersfield	18,638	9	.....	.....	.....	.....	.....	.....	.....	2
Glendale	13,536	9	.....	.....	.....	.....	.....	.....	1	1
Los Angeles	576,673	174	39	3	21	1	15	.....	75	19
Oakland	216,261	36	6	.....	1	.....	3	.....	2	5
Pasadena	45,354	12	.....	.....	1	.....	.....	.....	1	2
Riverside	19,341	6	1	.....	4	.....	.....	.....	.....	.....
Sacramento	65,908	17	2	.....	.....	.....	1	.....	.....	2
San Bernardino	18,721	11	1	.....	1	.....	5	.....	.....	.....
San Diego	74,683	25	2	.....	7	.....	2	.....	5	1
San Francisco	506,676	121	10	.....	46	.....	4	.....	26	7
Santa Ana	15,485	5	.....	.....	.....	.....	.....	.....	.....	.....
Stockton	40,296	11	5	.....	.....	.....	.....	.....	.....	.....
Vallejo	21,107	2	1	.....	.....	.....	1	.....	.....	.....
Colorado:										
Pueblo	43,050	9	1	.....	1	.....	1	.....	.....	.....
Connecticut:										
Bridgeport	143,555	16	8	.....	1	.....	3	.....	3	1
Bristol	20,620	1	.....	.....	.....	.....	.....	.....	.....	.....
Hartford	138,036	19	.....	.....	.....	.....	.....	.....	8	5
Manchester (town)	18,370	.....	.....	.....	.....	.....	1	.....	2	.....
Meriden (city)	29,867	.....	.....	.....	.....	.....	.....	.....	2	.....
Milford (town)	10,193	1	.....	.....	.....	.....	.....	.....	.....	.....
New Britain	59,316	7	.....	.....	.....	.....	1	.....	.....	.....
New Haven	162,537	33	1	.....	1	.....	.....	.....	5	3
New London	25,688	14	.....	.....	1	.....	.....	.....	.....	1
Waterbury	91,715	20	1	.....	.....	.....	3	.....	.....	1

CITY REPORTS FOR WEEK ENDED AUGUST 4, 1923—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
District of Columbia:										
Washington	437,571	122	4	1	8	.....	5	1	28	15
Florida:										
St. Petersburg	14,237	1	.....	.....	.....	.....	.....	.....	.....	.....
Georgia:										
Albany	11,555	.....	1	.....	.....	.....	.....	.....	.....	.....
Atlanta	200,616	63	3	.....	6	1	1	.....	10	2
Augusta	52,548	18	.....	2	.....	.....	.....	.....	.....	2
Brunswick	14,413	1	.....	.....	.....	.....	.....	.....	.....	.....
Lagrange	17,038	.....	4	.....	6	.....	.....	.....	.....	.....
Macon	52,995	.....	.....	.....	.....	.....	.....	.....	6	.....
Rome	13,252	.....	.....	.....	2	.....	1	.....	1	.....
Savannah	83,252	18	.....	.....	.....	1	.....	.....	1	4
Idaho:										
Boise	21,393	3	.....	.....	.....	.....	.....	.....	.....	.....
Illinois:										
Alton	24,682	6	.....	.....	.....	.....	.....	.....	1	.....
Bloomington	28,725	8	.....	.....	1	.....	.....	.....	2	.....
Centralia	12,491	5	.....	.....	.....	.....	.....	.....	.....	.....
Chicago	2,701,705	537	57	10	47	.....	31	1	234	44
East St. Louis	66,767	19	.....	.....	1	.....	.....	.....	2	1
Elgin	27,454	6	.....	.....	.....	.....	1	.....	.....	.....
Evanston	37,234	9	.....	.....	1	.....	.....	.....	.....	.....
Freeport	19,669	8	.....	.....	2	.....	1	.....	1	.....
Galesburg	23,834	4	.....	.....	.....	.....	.....	.....	.....	.....
Pekin	12,086	.....	1	.....	.....	.....	1	.....	.....	.....
Peoria	76,121	22	.....	.....	1	.....	.....	.....	.....	.....
Quincy	35,978	10	.....	.....	.....	.....	.....	.....	1	.....
Springfield	59,183	19	1	.....	.....	.....	.....	.....	2	2
Urbana	10,244	1	.....	.....	.....	.....	.....	.....	.....	.....
Indiana:										
Anderson	29,767	2	2	.....	.....	.....	.....	.....	.....	.....
Bloomington	11,595	3	.....	.....	.....	.....	.....	.....	.....	1
Crawfordsville	10,139	3	.....	.....	1	.....	.....	.....	.....	1
Elwood	10,790	2	.....	.....	.....	.....	.....	.....	.....	.....
Fort Wayne	86,549	22	2	1	.....	.....	2	.....	.....	1
Frankfort	11,585	2	.....	.....	1	.....	.....	.....	.....	.....
Gary	55,378	8	.....	.....	1	.....	1	.....	.....	1
Hammond	36,004	2	.....	.....	1	.....	.....	.....	.....	.....
Indianapolis	314,194	89	5	.....	5	.....	.....	.....	17	3
Kokomo	30,067	5	2	.....	.....	.....	.....	.....	.....	.....
La Fayette	22,486	7	.....	.....	.....	.....	.....	.....	.....	.....
Logansport	21,626	3	.....	.....	.....	.....	.....	.....	.....	.....
Michigan City	19,457	5	.....	.....	.....	.....	.....	.....	.....	.....
Mishawaka	15,195	4	.....	.....	.....	.....	.....	.....	.....	.....
Muncie	36,524	6	.....	.....	3	.....	.....	.....	.....	.....
Newcastle	14,458	4	.....	.....	.....	.....	.....	.....	.....	3
South Bend	70,983	11	1	.....	.....	.....	3	.....	.....	.....
Terre Haute	66,083	16	1	.....	3	.....	3	.....	.....	.....
Iowa:										
Sioux City	71,227	.....	1	.....	2	.....	.....	.....	.....	.....
Kansas:										
Coffeyville	13,452	3	.....	.....	.....	.....	.....	.....	.....	.....
Fort Scott	10,693	8	.....	.....	4	.....	.....	.....	.....	.....
Kansas City	101,177	.....	.....	.....	1	.....	1	.....	6	.....
Parsons	16,028	.....	.....	.....	1	.....	.....	.....	6	.....
Topeka	50,022	9	.....	.....	13	.....	.....	.....	1	.....
Kentucky:										
Covington	57,121	22	1	.....	2	.....	.....	.....	3	2
Henderson	12,169	4	.....	.....	.....	.....	.....	.....	.....	1
Lexington	41,534	17	.....	.....	1	.....	.....	.....	5	2
Louisville	234,891	67	.....	.....	4	.....	.....	.....	15	1
Louisiana:										
New Orleans	387,219	123	6	.....	3	.....	3	.....	12	14
Maine:										
Auburn	16,985	7	.....	.....	.....	.....	.....	.....	1	.....
Bangor	25,978	.....	.....	.....	1	.....	.....	.....	.....	.....
Bath	14,731	1	.....	.....	.....	.....	.....	.....	.....	.....
Biddeford	18,008	6	.....	.....	1	.....	.....	.....	1	.....
Lewiston	31,791	13	1	1	8	.....	1	.....	1	.....
Portland	69,272	17	.....	.....	1	.....	.....	.....	.....	.....
Sanford (town)	10,691	1	.....	.....	.....	.....	.....	.....	.....	.....

CITY REPORTS FOR WEEK ENDED AUGUST 4, 1923—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Maryland:										
Baltimore	733,826	181	9		47	2	19		21	21
Cumberland	29,837	8							1	
Frederick	11,066	4			1					
Massachusetts:										
Adams (town)	12,067	1								
Amesbury (town)	10,036	1								
Arlington (town)	18,665	4	2				1			
Attleboro	19,731	3								
Beverly	22,561	3							1	1
Boston	748,060	151	42		20		16	1	56	19
Braintree (town)	10,580	3	1						1	
Brockton	66,254	13					1		3	1
Brookline	37,748	4			1					
Cambridge	109,694	21	3		1	1	3		2	1
Chelsea	43,184	7	2				1		3	1
Chicopee	36,214	4	1				1			
Clinton	12,979	5			1		1		1	
Dedham	10,792	2								
Easthampton	11,261								1	
Everett	40,120	6	1	1			1		6	
Fall River	120,485	36	3				3		1	1
Fitchburg	41,029	5	2	1	10				1	
Framingham	17,033	4			1					1
Gardner	16,971	3	2				2		1	
Greenfield	15,462	1								
Haverhill	53,884	7	3		2		6			
Holyoke	60,203	12	4	1					1	
Lawrence	94,270	16			3		1		2	1
Leominster	19,744	3			2		1		1	
Lowell	112,759	34			3		2		2	2
Malden	49,103	14	1	1			3		1	1
Medford	39,038	3	2		1		2			
Melrose	18,204	3			1		1			
Methuen	15,189	5							4	2
New Bedford	121,217	26	5		2					
Newburyport	15,618	4							1	
North Adams	22,282	2								
Northampton	21,951	11					3		1	1
Pittsfield	41,763	15	1	1	3		5		1	1
Plymouth	13,045	3								
Quincy	47,876	10	2		1		1		1	
Somerville	93,091	19	1				3		2	1
Southbridge	14,245	1			3					
Springfield	129,614	28					4		5	
Taunton	37,137	9								1
Wakefield	13,025	2							1	
Waltham	30,915	8	5	1	1				2	
Watertown	21,457	1	1		1				1	1
Webster	13,258	3					1			
West Springfield	13,443	2								
Westfield	18,604	9					1			1
Winthrop	15,455	2								
Worcester	179,754	26	8						5	1
Michigan:										
Ann Arbor	19,516	6	1		7					
Battle Creek	36,164		2		2				2	
Detroit	993,678	201	15		12	2	26	1	24	21
Flint	91,599	24	7	1	6	1	1			1
Grand Rapids	137,634	30	1		9				15	
Hamtramck	48,615	10	3		4					
Highland Park	46,499	4			1		1			
Holland	12,183		1							
Kalamazoo	48,487	9	1		10		1			1
Pontiac	34,273	7			1		5			1
Port Huron	25,944	5	1							
Minnesota:										
Duluth	98,917	20	1		1		4		12	1
Minneapolis	380,582	61	9	2		2	5	1	7	8
Rochester	13,722	20	1		1					
St. Paul	234,698		10		4		8		6	
Winona	19,143				1					

CITY REPORTS FOR WEEK ENDED AUGUST 4, 1923—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Missouri:										
Cape Girardeau	10,252	3	1							
Independence	11,686		1		1		1			
St. Joseph	77,939	17	2		4				2	1
St. Louis	772,897	171	8	1	4		5		29	13
Montana:										
Anaconda	11,668	2								
Billings	15,100	2								
Great Falls	24,121	6			1					
Helena	12,037	2	4							
Missoula	12,668	4								
Nebraska:										
Omaha	191,601	41	16	1	1					3
Nevada:										
Reno	12,016	5								
New Hampshire:										
Dover	13,029	4								
Keene	11,210	2	2		6					
Nashua	28,379	6			2					
New Jersey:										
Asbury Park	12,400	9								
Atlantic City	50,707	15	1		1				1	1
Bayonne	76,754		1						5	
Belleville	15,660								1	
Bloomfield	22,019	1								
Clifton	26,470	2								
East Orange	50,710	7					1		2	
Elizabeth	95,783	2	3						3	
Englewood	11,627	2								
Garfield	19,381	2								
Hoboken	68,166	10							1	
Jersey City	298,103		9		5		1		9	
Kearny	26,724	6	2							
Morristown	12,548	3							1	
Orange	33,268	5								1
Passaic	63,841	12	2				2		1	1
Perth Amboy	41,707	5	1				1		1	
Plainfield	27,700	6							1	
Summit	10,174	2								
Trenton	119,289	29	15						2	1
West Hoboken	40,074	1								
West New York	29,926	2	1		2		1		1	
New Mexico:										
Albuquerque	15,157	3	1						4	1
New York:										
Albany	113,344		10		12		2		7	
Amsterdam	33,524	9			5		1		1	1
Auburn	36,192	6								
Cohoes	22,987	2	1							
Elmira	45,393	12					1			
Geneva	14,648	1								
Hornell	15,025	2			2					
Hudson	11,745	5								
Ithaca	17,004	5							1	
Jamestown	38,917	8			10					1
Lackawanna	17,918	4			10					
Lockport	21,308	4					1			
Mount Vernon	42,726		2						1	
New York	5,620,048	944	116	11	68	3	37		[1] 203	[1] 76
Newburgh	30,366	2							1	
North Tonawanda	15,482	2			9		3			
Olean	20,506	10					3	1		
Peekskill	15,868	8					1			
Plattsburg	10,909	5								
Rochester	295,750	57	4		4		5	1	8	5
Rome	26,341	10	1		3		2			1
Schenectady	88,723	14	9		6				4	
Syracuse	171,717	36	6		16	1	7		7	2
Watertown	31,285	9			7		1			
White Plains	21,031	6					2		2	

[1] Pulmonary only.

CITY REPORTS FOR WEEK ENDED AUGUST 4, 1923—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
North Carolina:										
Durham	21,719	3								
Rocky Mount	12,742	2								
Salisbury	13,884	5								1
Wilmington	33,372	17								1
North Dakota:										
Fargo	21,961	6								1
Grand Forks	14,010				2			1		
Ohio:										
Akron	208,435	24	6		5				5	
Barberton	18,811	7							2	
Bucyrus	10,425	1								
Cambridge	13,104	5					2			2
Canton	87,091	24		1						1
Cincinnati	401,247	108	5		10	1	2		12	11
Cleveland	796,841	163	15		21		16		32	9
Cleveland Heights	15,236				1					
Columbus	237,031	71	1						2	2
Dayton	152,559	35	1		1		4		1	
East Cleveland	27,292	4			1					
Findlay	17,021	5			1					
Fremont	12,498	4								
Hamilton	39,675	16								
Lima	41,326	8			1		2		1	
Lorain	37,295		2				2		1	
Mansfield	27,824	4	1				1			
Martins Ferry	11,634	3								
Middletown	23,594	4								
Newark	26,718	5			2					
Norwood	24,966		1						1	
Piqua	15,044	1							1	
Salem	10,305	2								
Sandusky	22,897	6								1
Springfield	60,840	11							1	2
Steubenville	28,508	8			1		1		1	
Toledo	243,164	58	9	1	1		10		6	4
Youngstown	132,358	29	15	2	4	2	10	1	4	
Zanesville	29,569	7					1			
Oklahoma:										
Tulsa	72,075						1			
Oregon:										
Portland	258,288	35	4	1	1		5		8	
Pennsylvania:										
Allentown	73,502		1				2		1	
Altoona	60,331						1			
Bethlehem	50,358		5		5		1		1	
Braddock	20,879		1				1			
Bradford	15,525				1					
Carbondale	18,640		1							
Carnegie	11,516		1				1			
Chester	58,030		1		1		1			
Coatesville	14,515		1							
Connellsville	13,804						3			
Dickson	11,049		1							
Donora	14,131		1							
Duquesne	19,011		1						1	
Erie	93,372				4					
Farrell	15,586		1		1				4	
Harrisburg	75,917				2					
Johnstown	67,327		3		1					
Lancaster	53,150		2							
McKees Rocks	16,713		1							
McKeesport	46,781				7					
Mahanoy City	15,599		1							
Mount Carmel	17,459								1	
New Castle	44,938				3		6			
New Kensington	11,987		2						1	
Norristown	32,319		2				3			
North Braddock	14,228		1				1		1	
Oil City	21,274								1	
Philadelphia	1,823,779	365	29	2	7		8		71	34
Pittsburgh	588,343	148	12		5	1	14			9
Pittston	18,497		1							
Plymouth	16,500		1							

CITY REPORTS FOR WEEK ENDED AUGUST 4, 1923—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Pennsylvania—Continued.										
Pottstown	17,431						1			
Pottsville	21,876				1				2	
Reading	107,784				1					
Scranton	137,783		1				1		3	
Shamokin	21,204				1					
Sharon	21,747		3				1		1	
Steelton	13,428		1							
Swissvale	10,908		3							
Uniontown	15,692						1			
Washington	21,480		4		1					
Wilkes-Barre	73,833				1				1	
Williamsport	36,198				11		2			
Rhode Island:										
Cumberland (town)	10,077	2								
Newport	30,255	3	1				3			1
Providence	237,595	40	4				2			1
South Carolina:										
Charleston	67,957	23			5					2
Columbia	37,524	15					1		2	1
Greenville	23,127	8			1					
South Dakota:										
Sioux Falls	25,202	7	3				1			
Tennessee:										
Chattanooga	57,895		1							
Memphis	162,351	57	2						15	5
Nashville	118,342	43	2		1		1		9	4
Texas:										
Amarillo	15,494	5								
Beaumont	40,422	6								
Dallas	158,976	55	3		2		3		4	3
El Paso	77,560	40					2		7	5
Galveston	44,255	6								1
Waco	38,500	14								
Utah:										
Provo	10,303	3	1							
Salt Lake City	118,110	23	2		7					1
Vermont:										
Burlington	22,779	3								
Virginia:										
Alexandria	18,060	4							1	1
Charlottesville	10,688	9								1
Lynchburg	30,070	6							1	
Norfolk	115,777				7				3	1
Petersburg	31,012	6	1		2		1		2	
Richmond	171,667	54			13	1	1		6	3
Roanoke	50,842	11			1		1			1
West Virginia:										
Charleston	39,608	16					2			1
Clarksburg	27,869	2	1		5					
Huntington	50,177	19								4
Martinsburg	12,515				1					
Parkersburg	20,050	5	1							1
Wisconsin:										
Appleton	19,561	2	1							
Beloit	21,284						2			
Eau Claire	20,906				4					
Fond du Lac	23,427	6								
Green Bay	31,017						1			
Janesville	18,293	1					1			
Kenosha	40,472	4	3	1						
Madison	38,378	5			3		4			
Manitowoc	17,563				2		1		1	
Marinette	13,610		1				1			
Milwaukee	457,147	84	8	2			8		15	7
Oshkosh	33,162	4	1							1
Racine	58,593	11					2		1	
Sheboygan	30,955	10	6				1		1	
Superior	39,671	4	3				6		1	
Wausau	18,661		6		3					
West Allis	13,745		2	2			3			

FOREIGN AND INSULAR.

BULGARIA.

Lethargic Encephalitis—Paratyphus—Sofia.

During the week ended May 19, 1923, two cases of lethargic encephalitis were reported at Sofia, Bulgaria.

Paratyphus fever has been reported as follows: Week ended May 19, 1923, four cases; week ended June 23, 1923, one case with one death.

COLOMBIA.

Yellow Fever—Bucaramanga.

During the three weeks ended July 15, 1923, yellow fever was reported still present at Bucaramanga, Colombia.

ECUADOR.

Plague—Plague-Infected Rats—Guayaquil.

During the period July 1 to 15, 1923, two cases of plague with two deaths were reported at Guayaquil. During the same period 4,500 rats were examined, of which number 4 were found plague infected.

EGYPT.

Status of Plague.

Plague has been reported in Egypt as follows: Week ended July 8, 1923—33 cases, of which 3 cases occurred at Port Said, the remaining cases being distributed in five districts, with the greatest occurrence, viz, 25 cases, reported for the district of Menoufieh. Week ended July 15, 1923—47 cases, of which 2 cases occurred at Alexandria and 5 cases at Port Said, the remaining cases being distributed in seven districts, with the greatest occurrence, viz, 29, in the district of Menoufieh.

The total number of cases reported from January 1 to July 15, 1923, was 1,190, as compared with 362 cases reported for the corresponding period of the preceding year.

Typhoid Fever Outbreak—Suez.

Under date of July 12, 1923, an outbreak of typhoid fever was reported at Suez, Egypt. On that date three cases (European) were stated to be present in hospital and two fatal cases (also European)

were stated to have occurred during the week ended July 5, 1923. The disease was stated to be present, with an unreported number of cases and deaths, among natives and Levantines. The source of the infection had not been determined. Masters of eastbound ships were warned by American consulate at Port Said not to take fresh water or allow shore leave at Suez.

GREAT BRITAIN.

Smallpox—Gloucester.

Under date of July 13 smallpox was reported still present at Gloucester, but with a diminishing number of new cases.[1]

Typhus Fever—Bootle (Vicinity of Liverpool).

A case of typhus fever was reported August 4, 1923, at Bootle, vicinity of Liverpool, England.

INDO-CHINA.

Cholera—Plague—Smallpox—October, 1922.

During the month of October, 1922, cholera, plague, and smallpox were reported in Indo-China as follows: Cholera—cases 92, deaths 53, as compared with 24 cases with 14 deaths reported in the preceding month and 100 cases with 61 deaths during October, 1921. Plague—cases 93, deaths 89, as compared with 70 cases with 68 deaths during the preceding month and 42 cases with 37 deaths in October, 1921. Smallpox—cases 250, deaths 47, as compared with 136 cases with 81 deaths during the preceding month and 115 cases with 26 deaths in October, 1921. (Population, 16,990,229.)

Influenza—October, 1922.

During the month of October, 1922, 29 cases of influenza with 9 deaths were reported in Indo-China, as against 30 cases among Europeans and 27 cases with 9 deaths among natives during the preceding month, and 505 cases with 15 deaths during the month of October, 1921.

Preventive Measures—October, 1922.

Preventive measures were reported as follows: Against plague—1,762 vaccinations; 6,187 rats destroyed; carried out in two Provinces, viz, Annam and Cambodge. Against smallpox—105,712 vaccinations in the Provinces of Cambodge, Cochin-China, and Laos.

[1] Public Health Reports, July 27, 1923, p. 1739; and Aug. 17, 1923, p. 1934.

ITALY.

Kala-Azar—Messina.

During the week ended June 24, 1923, one case of kala-azar with one death was reported at Messina, Italy.

JAMAICA.

Smallpox (Reported as Alastrim).

During the two weeks ended July 21, 1923, 80 new cases of smallpox (alastrim) were reported in the island of Jamaica. Of these, eight cases occurred in the parish of Kingston.

Typhoid Fever—Kingston and Vicinity.

During the same period four cases of typhoid fever with one case of paratyphoid fever were reported at Kingston, Jamaica, and 29 cases of typhoid fever in the surrounding country.

PERU.

Plague—June, 1923.

During the month of June, 1923, 54 cases of plague with 41 deaths were reported in Peru. Of these, 12 cases with 7 deaths were reported at Lima. For distribution of occurrence according to locality see page 1986.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER.

The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

Reports Received During the Week Ended August 24, 1923.[1]

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
India				June 3-9, 1923: Cases, 2,911; deaths, 2,360.
Bombay	June 24-30	3	3	
Madras	July 1-7	1		
Rangoon	June 24-30	1	1	
Indo-China				Oct. 1-31, 1922: Cases, 92; deaths, 53. Preceding month: Cases, 21; deaths, 14. October, 1921: Cases, 100; deaths, 61.
Province—				
Annam	Oct. 1-31	68	39	Preceding month: Cases, 2; deaths, 1.
Cambodge	do	2	1	Preceding month: Cases, 3.
Cochin-China	do	21	13	Preceding month: Cases, 19; deaths, 13.
Tonkin	do	1		Preceding month: No cases.
Siam:				
Bangkok	June 17-23	1	1	

[1] From medical officers of the Public Health Service, American consuls, and other sources.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received During Week Ended August 24, 1923—Continued.

PLAGUE.

Place.	Date.	Cases.	Deaths.	Remarks.
China:				
Amoy	June 17-23		3	
Ecuador:				
Guayaquil	July 1-15	2	2	Rats examined, 4,500; found infected, 4.
Egypt				Jan. 1-July 19, 1923: Cases, 1,198; deaths, 606.
City—				
Alexandria	July 9-15	2		Week ended July 8, 1923: Cases, 30, in 5 districts. Week ended July 15, 1923: Cases, 40, in 7 districts.
Port Said	July 2-15	8		
India				June 3-9, 1923: Cases, 386; deaths, 308.
Bombay	June 24-30	2	1	
Karachi	July 1-7	5	5	
Madras (Presidency)	do	5	4	
Rangoon	June 24-30	34	30	
Indo-China				Oct. 1-31, 1922: Cases, 93; deaths, 89. Preceding month: 70 cases; 68 deaths.
Province—				
Annam	Oct. 1-31	15	14	Preceding month, 15 deaths.
Cambodge	do	75	75	Preceding month, 51 deaths.
Cochin China	do	3		Preceding month, 4 cases, 2 deaths.
Peru				June 1-30, 1923: Cases, 54; deaths, 41.
Localities—				
Ayabaca	June 1-30	13	13	
Callao	do	2	2	
Canete	do	1		
Chiclayo	do	1		
Huancabamba	do	16	12	
Huara	do	2	2	
Lima (city)	do	12	7	
Lima (country)	do	2	1	
Mollendo	do	1	1	
Salaverry	do	4	1	
Trujillo	do		2	
Siam:				
Bangkok	June 10-23	3	5	
Straits Settlements:				
Singapore	June 24-30		1	
Syria:				
Beirut	June 1-10	1		

SMALLPOX.

Arabia:				
Aden	July 8-14	2		
Canada:				
British Columbia—				
Vancouver	June 24-30	2		
Do	July 1-14	5	1	
Manitoba—				
Winnipeg				July 1-31, 1923: Cases, 1.
Ontario—				
London	July 15-21	1		
China:				
Amoy	June 17-23			Present.
Chungking	June 17-30			Endemic.
Manchuria—				
Harbin	June 18-24	1		
Do	July 1-7	1		
Egypt:				
Cairo	Apr. 23-29	3		
Great Britain:				
Gloucester	July 15			Present.
Nottingham	July 8-14	1		
India				June 3-9, 1923: Cases, 941; deaths, 294.
Bombay	June 24-30	9	8	
Karachi	July 1-7	2		
Madras	do	4	1	
Rangoon	June 24-30	18	7	
Italy:				
Turin	July 2-15	2		
Japan:				
Kobe	July 2-8	1		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received During Week Ended August 24, 1923—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Java:				
East Java—				
Soerabaya	June 3-16	43	13	
Mexico:				
Guadalajara	July 22-28		2	June 1-30, 1923: Cases, 15; deaths, 2.
Mexico City	July 1-14	36		
Portugal:				
Lisbon	June 25-30		2	
Do	July 1-7		2	
Oporto	July 8-28	7	2	
Siam:				
Bangkok	June 10-23	17	10	
Spain:				
Barcelona	June 28-July 10		2	
Valencia	July 8-21	13	3	
Switzerland:				
Berne	July 1-7	1		

TYPHUS FEVER.

Bulgaria:				
Sofia	May 19-June 23	3	1	Paratyphus, 1 case, 1 death.
Great Britain:				
Bootle	Aug. 4	1		Vicinity of Liverpool.
Greece:				
Saloniki	May 28-June 24	29	12	
Mexico:				
San Luis Potosi	July 29-Aug. 4		1	
Syria:				
Aleppo	July 8-14			Present.

YELLOW FEVER.

Colombia:				
Bucaramanga	June 25-July 15			Present.

Reports Received from June 30 to August 17, 1923.[1]

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
India				Apr. 15-June 2, 1923: Cases, 9,250; deaths, 8,123.
Bombay	June 3-23	31	20	
Calcutta	May 6-June 23	289	242	
Madras	June 3-30	2		
Rangoon	May 13-June 23	17	11	
Indo-China:				
Saigon	May 20-June 9	11	10	
Philippine Islands:				
City—				
Manila	June 10-16	2	1	Death in foreign case from Chingkang, China.
Province—				
Bulacan	May 17-23	1		
Capiz	May 27-June 2	1	1	
Cebu	Apr. 8-21	1	1	
Cotobato	Apr. 8-14	1	1	
Laguna	May 6-June 9	2	1	
Mountain	Mar. 25-31	1	1	
Pangasinan	June 24-30	2	2	
Russia (Soviet)				Jan. 1-May 15, 1923: Cases, 10.
Siam:				
Bangkok	May 13-June 9	8	9	

[1] From medical officers of the Public Health Service, American consuls, and other sources.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from June 30 to August 17, 1923—Continued.

PLAGUE.

Place.	Date.	Cases.	Deaths.	Remarks.
Australia:				
Sydney	June 30	1	1	
Azores:				
St. Michael Island	May 6–26	12	5	In one locality.
British East Africa:				
Kenya—				
Kisumu	June 10–16	2	1	
Tanganyika	May 6–June 2	3	3	Territory.
Uganda	Apr. 1–30	7	5	
Canary Islands:				
Las Palmas	June 7	1		
Ceylon:				
Colombo	May 6–June 23	15	17	Plague rats, 36.
China:				
Amoy	May 13–June 25		7	
Foochow	May 27–June 23			Present.
Hongkong	Apr. 29–June 23	51	28	
Manchuria—				
Yakoshih	May 31	1	1	Station on Eastern Chinese Railway. Occurring in tarabagan (marmot) hunter. Bubonic.
Nanking	June 17–30			Rodent plague present.
Do	July 1–7			Do.
Ecuador:				
Guayaquil				May 16–June 30, 1923: Rats examined, 13,800; found infected, 39.
Egypt				Jan. 1–June 21, 1923: Cases, 1,051; deaths, 548. May 1–29: Cases, 345. Jan. 1–June 24, 1923: Cases, 1,069. Jan. 1–July 7, 1923: Cases, 1,110.
City—				
Alexandria	Jan. 7–June 24	35	15	May 1–29, 1923: Cases, 14.
Do	July 1–7	1		
Port Said	Jan. 7–June 24	24	12	May 1–29, 1923: Cases, 13.
Do	July 1–7	2		
Suez	Mar. 2–June 15	12	7	May 1–29, 1923: Cases, 3.
Province—				
Assiout	May 1–29	64		Deaths not reported.
Benisouef	do	7		Do.
Fayoum	do	14		Do.
Garbieh	do	2		Do.
Geizeh	do	3		Do.
Girgeh	do	123		Do.
Keneh	do	22		Do.
Menoufieh	do	34		Do.
Minieh	do	46		Do.
Hawaii:				
Hamakua				Plague-infected rats: Pohakea, May 23, 1923, 1 rat; vicinity of Pacific Sugar Co. mill, June 2, 1 rat.
India				Apr. 29–June 2, 1923: Cases, 4,240; deaths, 3,209.
Bombay	Apr. 29–June 23	501	410	
Calcutta	May 6–June 9	13	13	
Karachi	May 13–June 30	110	85	Plague rats, 5.
Madras Presidency	do	254	141	
Rangoon	May 6–June 23	226	199	
Iraq (Mesopotamia):				
Bagdad	May 1–31	222	143	
Java:				
East Java—				
Soerabaya	Apr. 1–May 19	488	488	May 1–31, 1923: Cases, 471; deaths, 471.
Soerakarta				May 16, 1923: Epidemic in five districts.
Madagascar				Apr. 1–June 15, 1923: Cases, 74; deaths, 71. Bubonic, pneumonic, septicemic.
Province—				
Tananarive	Apr. 1–June 15	56	53	
Tananarive	Apr. 16–June 15	20	20	
Mauritius Island				May 4–21, 1923: Two cases.
Port Louis	May 4	1		
Mexico:				
Tampico				Apr. 15–21, 1923: 1 plague rat.
Palestine:				
Jaffa	June 19–July 2	8	1	Bubonic and septicemic.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from June 30 to August 17, 1923—Continued.

PLAGUE—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Peru				May 1–31, 1923: Cases, 57; deaths, 27.
Locality—				
Ayabaca	May 16–31	2		
Callao	May 1–31	3	1	
Canete	May 16–31	2	2	
Cerro Azul	May 1–31	3	1	
Chiclayo	do	8	2	
Cutervo	May 1–15	2	1	
Huancabamba	May 1–31	18	13	
Lima (city)	do	5	1	
Lima (country)	do	5	3	
Salaverry	do	7	2	
Trujillo	do	2	1	
Russia				Jan. 1–May 15, 1923: Few cases in Far East regions.
Siam:				
Bangkok	Apr. 29–June 9	24	21	
Siberia				Sporadic cases of plague reported yearly in localities vicinity of stations Matsievskaya and Borzia, Transbaikal Railway.
Haranhor	May 6	1	1	Village in zone of endemic tarabagan (marmot) plague, Transbaikal Region.
Station No. 83				Station on Transbaikal Railway. Marmot plague during recent years.
Soktu				Do.
Straits Settlements:				
Singapore	May 6–June 23	4	6	
Syria:				
Beirut	May 12–21	1		

SMALLPOX.

Algeria:				
Algiers	May 1–31	2		
Arabia:				
Aden	May 27–June 2		1	
Bolivia:				
La Paz	Apr. 1–30	1	2	
Brazil:				
Pernambuco	May 6–June 16	5		
Rio de Janeiro	May 13–June 23	10	2	
British East Africa:				
Kenya—				
Mombasa	May 20–26	1		From vessel from Bombay.
Tanganyika	Apr. 29–May 5	2		
Uganda—				
Entebe	Apr. 1–30	4		
Canada:				
Alberta—				
Calgary	May 27–June 2	1		Infection from Deer Lodge, Mont.
British Columbia—				
Vancouver	May 27–June 23	31		
Manitoba—				
Winnipeg	June 3–30	4		
New Brunswick—				
Kent County	July 1–7	1		
Ontario				June 1–30, 1923: Cases, 13. July 1–31, 1923: Cases, 14.
Toronto	June 24–30	3		
Do	July 15–21	1		
Quebec—				
Quebec	June 10–16	1		Varioloid.
Saskatchewan—				
Moose Jaw	July 8–14	1		
Regina	June 24–30	3		
Ceylon:				
Colombo	May 6–June 2	23	1	
Chile:				
Concepcion	May 22–June 11		3	June 1–30, 1923: Cases, 2.
Valparaiso	May 7–June 23	6	121	June 10–16, 1923: 29 cases reported from 2 districts.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from June 30 to August 17, 1923—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
China:				
Amoy	May 13–June 16		3	June 19–25, 1923: Present.
Antung	May 14–20	1		
Chungking	May 13–June 16			Present and endemic.
Foochow	May 13–June 23			Do.
Hongkong	Apr. 29–June 23	65	53	
Manchuria—				
Dairen	May 21–27	1		
Harbin	May 7–June 3	4		
Mukden	May 13–20	1		
Nanking	May 13–June 23			Do.
Do	June 24–July 7			Do.
Shanghai	May 21–June 3	4		Foreign.
Do	July 2–8	1	2	Cases, foreign; deaths, Chinese.
Chosen (Korea):				
Chemulpo	May 1–31	1		
Fusan	do	1		
Gensan	do	1		
Seoul	do	33	9	
Cuba:				
Antilla	July 8–14		2	From Preston.
Czechoslovakia				Jan.–Mar., 1923: Cases, 15.
Ecuador:				
Guayaquil	May 16–31	1		
Egypt:				
Cairo	Mar. 12–Apr. 22	9	3	
Finland				May 1–15, 1923: 1 case.
Great Britain:				
Birmingham	June 18–30	3		
Bristol	June 28			Present.
Cardiff	June 3–30	6		
Gloucester	June 28			123 cases reported in hospital; present in rural districts.
Do	July 12	19		
Nottingham	June 3–9	1		May 1–31, 1923: Cases, 211.
Greece:				
Athens	May 1–31	53		
Patras	Apr. 24–June 15		19	
Saloniki	Apr. 30–May 20	2	2	
India				Apr. 15–May 5, 1923: Cases, 4,973; deaths, 1,424.
Bombay	Apr. 22–June 23	289	133	
Calcutta	May 13–June 9	12	9	
Karachi	May 13–June 30	24	8	
Madras	May 13–June 23	91	16	
Rangoon	May 6–June 23	107	60	
Indo-China:				
Saigon	May 20–June 23	28	20	Including 100 surrounding square kilometers.
Iraq (Mesopotamia):				
Bagdad	Apr. 1–May 31	20		
Italy:				
Turin	May 28–June 3	1		
Jamaica				May 27–June 30, 1923: Cases, 226. July 1–7, 1923: Cases, 13. (Reported as alastrim.)
Kingston	May 27–June 30	39		
Do	July 1–7	12		
Japan:				
Kobe	May 28–June 10	2		
Java:				
East Java—				
Soerabaya	Apr. 22–June 2	129	19	
West Java—				
Batavia	May 5–June 8	17	3	Province.
Latvia				Apr. 1–30, 1923: Cases, 3.
Mexico:				
Aguascalientes	July 8–14		1	
Chihuahua	June 11–24	7		
Mexico City	May 19–June 30	164		Including municipalities in Federal District.
Palestine:				
Jaffa	June 5–11	1		
Persia:				
Tabriz	Apr. 1–14		1	District.
Teheran	Feb. 22–May 14		28	
Portugal:				
Lisbon	May 20–June 30	35	1	May 28–June 9, 1923: Cases, 8; deaths, 2.
Oporto	June 10–30	6	3	
Do	July 9–15	5	4	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from June 30 to August 17, 1923—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Portuguese West Africa:				
Angola—				
Loanda	Apr. 1-21		2	
Rhodesia (British Africa):				
Northern Rhodesia	May 8-14	21	8	
Southern Rhodesia	May 3-16	4	2	
Siam:				
Bangkok	Apr. 29-June 9	62	33	
Sierra Leone:				
Kaballa	May 1-15	1		
Pujehun	May 16-31	1		In Sembehun district.
Spain:				
Barcelona	May 31-June 6		1	
Valencia	May 15-June 30	44	2	
Do	July 1-7	8	1	
Switzerland:				
Basel	May 27-June 30	4		
Berne	May 20-June 30	11		
Lucerne	May 1-June 7	36		
Zurich	May 20-June 23	10		
Syria:				
Damascus	May 15-June 11	7		
Tunis:				
Bizerta	June 10-20	1		
Tunis	June 11-17	1		
Do	June 26-July 1	1		
Turkey:				
Constantinople	May 13-June 26		45	
Do	June 27-July 3		4	
Union of South Africa				May 1-31, 1923: Cases, 33; deaths, 1 (colored).
Cape Province				May 1-31, 1923: Cases, 32 (colored).
Do	May 6-June 9			Outbreaks.
Orange Free State	Apr. 29-May 14			Do.
Transvaal				May 1-31, 1923: 1 case.
Do	May 26-June 9			Outbreaks.
Yugoslavia:				
Serbia—				
Belgrade	June 10-16	1	1	
In vessels:				
S. S. Kargola	May 20-26	1		At Mombasa, British East Africa. Vessel arrived from Bombay Mar. 25, 1923.
S. S. Makura	May 26	2		Two cases in quarantine (reported as alastrim). Vessel left Victoria, B. C., Apr. 28, 1923. Touched at Honolulu.

TYPHUS FEVER.

Algeria:				
Algiers	May 1-31	41	14	
Argentina:				
Rosario	May 25-31		3	
Bulgaria:				
Sofia	Apr. 22-May 12	8	1	Paratyphus, 1 case, 1 death.
Chile:				
Concepcion	May 22-June 18		3	
Talcahuano	May 13-19	1		
Valparaiso	May 7-June 23		36	June 11, 1923: 34 cases in Salvador Hospital.
China:				
Antung	May 28-June 24	12		
Hankow	May 19-25	1		
Manchuria—				
Harbin	May 6-13	1		
Mukden	May 14-20	2		
Czechoslovakia				Jan.-Mar., 1923: Cases, 191; deaths, 6.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from June 30 to August 17, 1923—Continued.

TYPHUS FEVER—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Egypt:				
Alexandria	May 14–June 24	7	5	
Do	June 25–July 1	2	2	
Cairo	May 12–Apr. 15	11	8	
France:				
Marseille	Mar. 1–May 31	.....	3	
Germany:				
Coblenz	May 27–June 2	.....	1	
Hamburg	May 20–26	3	.....	
Königsberg	May 13–June 2	2	.....	
Stettin	May 27–June 9	1	1	
Greece		.....	.....	May 1–31, 1923: Cases, 876.
Athens	May 1–31	150	5	
Patras	Apr. 24–June 15	.....	30	
Piræus	May 1–31	353	11	
Saloniki	Apr. 30–May 27	27	4	Recurrent typhus: Cases, 3; deaths, 3.
Guatemala:				
Guatemala City	Apr. 1–June 30	.....	5	
Hungary		.....	.....	Jan. 1–May 19, 1923: Cases, 318;
Budapest	Jan. 1–June 2	48	12	deaths, 36. In 11 counties.
Irak (Mesopotamia):				
Bagdad	Apr. 1–30	2	.....	
Japan:				
Nagasaki	July 2–8	1	.....	
Latvia		.....	.....	Apr. 1–30, 1923: Cases, 96.
Mexico:				
Mexico City	May 20–June 30	75	.....	Including municipalities in Federal district.
Palestine:				
Jaffa	May 22–28	2	.....	
Do	June 26–July 9	4	.....	Relapsing fever, 1 case.
Jerusalem	May 22–28	1	.....	
Persia:				
Tabriz	Apr. 1–14	2	.....	
Teheran	Feb. 22–May 14	.....	2	
Poland		.....	.....	Mar. 4–Apr. 7, 1923: Cases, 2,253; deaths, 172. Recurrent typhus: Cases, 338; deaths, 6.
Portugal:				
Oporto	June 10–16	1	.....	
Do	July 1–21	3	.....	
Rumania:				
Kishineff	May 1–31	28	.....	
Russia		.....	.....	Jan. 1–Apr. 30, 1923: Cases, 106,854. (Corresponding period 1922: Cases, 847,516.) Feb. 1–28, 1923: Cases, 17,577. Recurrent, Jan. 1–Feb. 28, 1923: Cases, 43,540.
European Russia and autonomous republics	Jan. 1–Apr. 30	93,999	.....	
Siberia, Caucasus, and Central Asia	.....do	9,921	.....	
Waterways and railways	.....do	2,934	.....	
Spain:				
Barcelona	June 21–27	.....	1	
Madrid	May 1–31	.....	1	
Syria:				
Aleppo	May 20–June 16	4	2	
Beirut	May 1–10	1	.....	
Tunis:				
Tunis	May 28–June 24	3	2	
Do	July 9–15	1	1	
Turkey:				
Constantinople	May 13–June 26	.....	19	
Do	June 27–July 3	.....	1	
Union of South Africa		.....	.....	May 1–31, 1923: Cases, 102; deaths, 21 (colored). White—Cases, 6. Total, 108 cases, 21 deaths.
Cape Province		.....	.....	May 1–31, 1923: Cases, 49 (colored); white, 5.
Do	Apr. 29–June 9	.....	.....	Outbreaks.
Natal		.....	.....	May 1–31, 1923: One case (colored).
Orange Free State		.....	.....	May 1–31, 1923: Cases, 45 (colored).
Do	May 6–26	.....	.....	Outbreaks.
Transvaal		.....	.....	May 1–31, 1923: Cases, 7.
Do	May 6–12	.....	.....	Outbreaks.
Johannesburg	May 1–31	1	3	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from June 30 to August 17, 1923—Continued.

TYPHUS FEVER—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Yugoslavia:				
Croatia—				
Zagreb	May 27–June 2	1		

YELLOW FEVER.

Brazil:				
Bahia	May 13–June 16	21	6	